INFLUENCE OF INSTRUCTIONAL LEARNING STRATEGIES AND CLASSROOM ENVIRONMENT ON ACHIEVEMENT AND RETENTION IN MALAYALAM LANGUAGE OF STANDARD VII PUPILS

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Thesis
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DECLARATION

I, Sasidharan P., do hereby declare that this thesis ***Influence of Instructional Learning Strategies and Classroom Environment on Achievement and Retention in Malayalam Language of Standard VII Pupils*** has not been submitted by me for the award of a Degree, Diploma, Title or Recognition before.

C.U. Campus,
24. 7. 2002

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CERTIFICATE

I, Dr. P.K. Sudheesh Kumar, do hereby certify that this thesis ***Influence of Instructional Learning Strategies and Classroom Environment on Achievement and Retention in Malayalam Language of Standard VII Pupils***, submitted to the University of Calicut, is a record of bonafide study and research carried out by **Shri. Sasidharan P.**, under my supervision and guidance. The report has not been submitted by him for the award of a Degree, Diploma, Title or Recognition before.

C.U. Campus,
24.7.2002

Dr. P.K. Sudheesh Kumar
(Supervising Teacher)

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C.U. Campus,
24.7.2002

Sasidharan P.

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Chapter I

INTRODUCTION

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- Definition of Key Terms
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In the field of Education, a global phenomenon has been noted that educators fail to achieve the objectives of teaching upto the desired extent. Consequently students fail to attain the task at the level that is expected for their age or grade in the schools. Though the present system of education is planned to provide equal opportunity to all, the Educational field is getting troubled with the phenomenon described earlier. Only a few students are considered as the ***winners*** and most of the others as the ***losers***. Most of the students leave the school after ten or twelve years of education with ***losers' complex,*** which would directly influence their future social life.

Most of the educational systems in the undeveloped and developing countries are still following the Conventional Lecture Method of Teaching in which the teacher dominates the entire classroom activity. In such an approach the interaction is basically a one-way street from teacher to student. There is only minimum student-teacher interaction and student - student interaction. The whole class is treated as a single group, inwhich the teacher is the authority. The only duty of the students is to ***record the knowledge*** coming from the teacher and reproduce it whenever needed. There is no provision for freedom, interaction and social development. ***Competition*** is the base value. Students are competing with each other to get a high position in the ***rank order***. Only a few, who survive these situations are considered as ***the best*** and the others are ***the worst***. In such a classroom, students' social,

emotional and psychological developments are neglected. The only aim is to rank the students ***from the highest to the lowest*** based on Academic Achievement.

Some Psycho-educational researchers argued for a change from Whole-Class Instruction to ***Small Group Instruction*** and competition to ***cooperation,*** so that this change would help to overcome the traditional obstacles of the educational system (Johnson & Johnson, 1975; Fraser & Walberg, 1984; Slavin, 1990 and Bennett & Dunne, 1992). They emphasized not only on academic productivity but also on social productivity of the educational process. Hence they have attempted to make use of ***cooperation*** rather than competition among learners in the class, as it is a strong human instinct.

A number of studies were conducted later on Cooperative Learning and it was found that Cooperative Learning significantly improves Achievement (Wills, 1990; Brush, 1996 and Geiss & Mayer, 1998); helps to develop social skills and democratic values (Angry, 1990 and Xin, 1996); promotes self esteem (Sharan, 1990 and Slavin, 1990) and provides environment conducive to learning (Johnson, *et al.,* 1984 and Fraser & O' Brien, 1985).

Without a proper environment learning is not possible. Research evidences show that Classroom Environment is a strong sociological factor that can directly influence students' Academic Achievement (Ames, 1992; Mc Robbie & Fraser, 1993 and Goh & Fraser, 1995). Several other findings show that conventional autocratic classroom fails to provide proper Classroom Environment and hence students' Achievement is getting decreased (Johnson, *et al.,* 1984 and Brauer, *et al.,* 1997).

However, in the light of the findings described earlier, it can be concluded that, Instructional Learning Strategies and Classroom Environment can influence pupils' Academic Achievement significantly.

1.1. NEED AND SIGNIFICANCE

Former researches on learning were primarily concerned with characteristics of the Pupils, Teachers and Contextual factors in which learning takes place. Little attention was paid to what actually happened in the classrooms or how much pupils learned. These deficiencies were filled by some researchers who concentrated on the classroom and learning process (Watson & Johnson, 1972; Slavin, 1983a,b and Olsen & Kagan, 1992). Some of them found that Instructional Learning Strategies can influence the outcome of Education tremendously. As a result of these findings, the argument for changing the conventional Whole Class Instruction was strengthened. In Whole Class Instruction, individual attention in the classroom is not possible. Bennett and Dunne (1992) considered Whole Class Instruction as unacceptable because it is undifferentiated. Thus Individualized Instruction and Competitive Learning are experimented in the educational field. But such procedures had defects and difficulties.

Individualized Instructions such as Programmed Learning, Contracting, Mastery Programmes would require a heavy workload for the teacher (Varaprasad, 1997). Bennett and Dunne (1992) consider Individualized Instruction as unworkable because it requires a huge amount of material, time and teaching staff. Moreover there is no provision for interaction.

In Competitive Learning, a negative interdependence would be promoted. Slavin (1990) has noted that competition tends to discourage students from helping each other. This situation is quite opposite to the theories of socialization.

Some among the researchers who worked on Small Group Instruction, recognised ***cooperation*** as the predominant characteristic of human beings. With this realisation researchers made use of the innate human characteristic -- to cooperate with others - in the process of learning (Johnson & Johnson, 1975; Sharan, 1980 and Slavin, 1983a,b). Eventually a number of Cooperative Learning activities were evolved on the basis of a number of theoretical perspectives. Lee (1997) describes them such as social psychology (***Jigsaw Learning and Learning Together***), developmental psychology (***Cooperative controversy, Pairs check***), motivation theory (***STAD - Student Teams Achievement Divisions***), multiple intelligence theory (***Talking chips***) and humanistic psychology (***Group Investigation***).

Drawing the spirit of inquiry from these attempts, a number of studies were conducted inorder to find out the relationship between Cooperative Learning and Academic Achievement. Most of the studies revealed a positive relationship between the variables (Wills, 1990; Ellett, 1994; Lurie & Ovrebo, 1995; Gillies & Ashman, 1996; Leung & Chung, 1997; Geiss & Mayer, 1998 and Lee, *et al.*, 1999). But the results were not ***consistent*** always. Many studies found a negative relationship between Cooperative Learning and Academic Achievement (Okebukola, 1984; Slavin, 1985; Malouf, 1990; Pisani, 1994 and Fourts, 1995).

The ultimate aim of education is not mere learning. Nunan (1989) is of the view that pupils need to ***learn - how to learn***. Students need to develop

skills and attitudes towards learning that form the basis of future academic growth (Franklin, 1990). For these needs, Cooperative Learning would be a solution strategy because it has been found that Cooperative Learning contributes not only to Academic Achievement but also helps to develop social skills and democratic values that are beneficial to society as well as to each individual (Angry, 1990; Jackson, 1990; Felder, 1995 and Xin, 1996).

Besides Instructional Learning Strategy, the learning environment also plays an ***important role in the process of learning***. Piaget (1973) the developmental theorist and Bandura (1977) the social learning theorist, describe learning as a continuous reciprocal interaction of the individual with his/her environments. Classroom Environment is the climate or atmosphere of the class as a social group that potentially influence what students learn. The classroom may be perceived by the students as a ***learning community***, just as the family, so that they can overcome the problem of artificiality and boredom. Bohrer (1995) describes Classroom Environment as one of the basic areas through which teachers can influence to help students experience success. Research evidences show that successful learning is not possible without proper environment. It is a strong sociological factor that can deeply influence Academic Achievement. A number of studies were conducted inorder to find out the influence of Classroom Environment on Academic Achievement and these reported a positive relationship (Mc Robbie & Fraser, 1993; Bryant, 1994; Lewis, 1995; Martin, 1996; Devi, 1997; Young, 1998a; Leonard, 1999 and Johnson, 2000). But inconclusive results were also reported by many researchers (Hranitz & Shanoski, 1994; Finkelstein, 1995; Panikkar, 1996; Suresan, 1997; Elvy, 1998 and Lee, *et al.*, 1999).

Some researchers have related Classroom Environment with students' ***cooperation*** and Cooperative Learning, and it was found that Cooperative Learning causes higher Academic Achievement not only as a better learning method but also it provides a Classroom Environment conducive for learning (Brauer, *et al.*, 1997; Hodges & Wolf, 1997; Geiss & Mayer, 1998 and Klein, *et al.*, 1998).

Many researchers advocated Cooperative Learning Strategies for language learning because it was found very effective (Manarino-Leggett & Salomon, 1990; Angry, 1990 and Stevens & Slavin, 1995). But from the review, the investigator could not locate studies that relate Instructional Learning Strategies (especially Cooperative Learning Strategy), Classroom Environment and language learning (especially Indian language). So the present study is designed to have two phases. In the first phase the ***effectiveness of Cooperative Learning over Conventional lecture Method,*** if any, is examined. ***Interaction of Instructional Learning Strategies and Classroom Environment*** is focussed in the second phase. The investigator found relevance in such a study in Indian context. Thus the investigator took up the present study as INFLUENCE OF INSTRUCTIONAL LEARNING STRATEGIES AND CLASSROOM ENVIRONMENT ON ACHIEVEMENT AND RETENTION IN MALAYALAM LANGUAGE OF STANDARD VII PUPILS.

1.2. STATEMENT OF THE PROBLEM

The present study is entitled **INFLUENCE OF INSTRUCTIONAL LEARNING STRATEGIES AND CLASSROOM ENVIRONMENT ON ACHIEVEMENT AND RETENTION IN MALAYALAM LANGUAGE OF STANDARD VII PUPILS.**

1.3. DEFINITION OF KEY TERMS

This section is aimed at defining the important terms used in the statement of the problem.

1.3.1 INSTRUCTIONAL LEARNING STRATEGY

Stones and Morris (1977) define Instructional Learning Strategy as a generalised plan for a lesson which includes structure, desired learning behaviour in terms of goals of instruction and an outline of planned tactics necessary to implement the strategy. In the present study it comprises ***Cooperative Learning*** and ***Conventional lecture Method of Teaching.***

Cooperative Learning Strategy is an ***Instructional Learning Strategy*** in which small teams each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping team-mates learn, thus creating an atmosphere of achievement.

The particular Cooperative Learning Strategy selected for the present study is ***Jigsaw-II Model*** (Slavin, 1980). In Jigsaw-II model, the whole class is divided into small groups and all students get a common narrative such as a book chapter or a short story. However, each member of the group is given a topic on which to become an expert. After a preliminary study of the topic, the students who have the same topic meet in ***expert*** groups and strengthen their learning. Then they return to their teams. Peer teaching takes place in turn. Thus all students learn the total topic. Then students take individual quizzes, which are formed into team scores and the highest scoring teams and individuals are appreciated.

Conventional lecture Method of Teaching refers to the teaching method followed by almost all teachers in Kerala state. In this method, teacher's lecture is the main activity, ie detailed oral explanation of the learning material takes place in the classroom.

1.3.2. CLASSROOM ENVIRONMENT

According to Hawes and Hawes, (1982) Classroom Environment is the totality of external surroundings including conditions, circumstances and events in education often considered the extent to which such surroundings facilitate learning.

1.3.3. ACHIEVEMENT IN MALAYALAM LANGUAGE

In the present study, Achievement in Malayalam Language is the accomplishment of proficiency of performance in a given skill or body of knowledge in Malayalam Language as measured by a standardised test.

1.3.4. RETENTION

Good (1973) describes Retention as the result of an excitation, experiences, of response occurring as a persisting after-effect, that may serve as the basis for future modification of response or experience; regards as one of the necessary factors in the determination of habit formation and memory.

Deese and Hulse (1967) define Retention as the extent to which material originally learned is still retained.

In the present study, Retention is considered as the amount of the learned material that can be correctly remembered after a fixed interval of time.

Retention can be categorised into two, short-term Retention and long-term Retention (Deese & Hulse, 1967). In short-term Retention, the Retention period will be a few seconds; in long-term Retention, it may be days, months or years. In the present study the long-term Retention is considered. The Retention interval was fixed for one month.

A baseline should be needed from which to measure Retention (Deese & Hulse, 1967). The actual quantity of the learned material existed immediately after the learning is over can be considered as the baseline. In the present study, an Achievement test (Post test-I) was conducted (immediately after the completion of the treatment) for this purpose. After the Retention interval (one month), the same Achievement test (Post test-II) was conducted again, in which the subjects had to reproduce the learned material by recall, recognition and reconstruction. Thus the amount of learned material forgotten after one month was measured (Amount forgotten = Amount learned - Amount retained - Deese & Hulse, 1967). The amount of Retention was calculated by subtracting the amount forgotten from the amount learned.

1.3.5. STANDARD VII PUPILS

The term standard VII pupils is used in the study to denote pupils attending standard VII in any of the recognised schools of Kerala state.

1.4. VARIABLES

The following Independent Variables, Dependent Variables and Control Variables were selected for the present study.

1.4.1. INDEPENDENT VARIABLES

The following are the Independent Variables selected for the study.

1.4.1.1. **Instructional Learning Strategies** (Cooperative Learning - Jigsaw II Model and Conventional lecture Method of Teaching) and

1.4.1.2. **Classroom Environment**

1.4.2. DEPENDENT VARIABLES

Dependent Variables selected for the present study are the following.

1.4.2.1. **Achievement in Malayalam Language** (Objectivewise scores in Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation and a Total score).

1.4.2.2. **Retention in Malayalam Language** (Objectivewise scores in Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation and a Total score).

1.4.3. CONTROL VARIABLES

The following are the Control Variables selected for the study.

1.4.3.1. Pre-experimental Status in terms of Achievement in Malayalam Language (Pre-test score)

1.4.3.2. Verbal Intelligence

1.4.3.3. Non-verbal Intelligence

1.5. OBJECTIVES

The following are the objectives of the present study.

1.5.1. To study whether there exists any difference or not in the mean ***Achievement scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

1.5.2. To study whether there exists any difference or not in the mean ***Gain scores*** of the Experimental and Control groups for the Total sample, Boys and Girls.

1.5.3. To study whether there exists any difference or not in the mean ***Retention scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

1.5.4. To study the effectiveness of ***Cooperative Learning Strategy*** over ***Conventional lecture Method of Teaching,*** if any, in terms of Achievement in Malayalam Language of standard VII pupils.

1.5.5. To study the effectiveness of ***Cooperative Learning Strategy*** over ***Conventional lecture Method of Teaching,*** if any, in terms of Retention in Malayalam Language of standard VII pupils.

1.5.6. To study the main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.5.7. To study the interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.5.8. To study the main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objetivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.5.9. To study the interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.6. HYPOTHESES

The hypotheses tested in the present study are the following:

1.6.1 There will be no significant difference in the mean ***Achievement scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

1.6.2. There will be no significant difference in the mean ***Gain scores*** of the Experimental and Control groups for the Total sample, Boys and Girls.

1.6.3. There will be no significant difference in the mean ***Retention scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

1.6.4. Pupils taught through ***Cooperative Learning Strategy*** will not differ significantly from pupils taught through ***Conventional lecture Method of Teaching*** in terms of ***Achievement in Malayalam Language*** of standard VII pupils.

1.6.5. Pupils taught through ***Cooperative Learning Strategy*** will not differ significantly from pupils taught through ***Conventional lecture Method of Teaching*** in terms of ***Retention in Malayalam Language*** of standard VII pupils.

1.6.6. There will be no significant main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.6.7. There will be no significant interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.6.8. There will be no significant main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.6.9. There will be no significant interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

1.7. METHODOLOGY

Methodology of the present study is outlined briefly as the following.

1.7.1. DESIGN OF THE STUDY

The present study was conducted by employing the Experimental design. The particular design of the study is the ***Pretest-Posttest Equivalent-Groups Design***. The Experimental group was taught through the Cooperative

Learning Strategy and the Control group was taught through the Conventional lecture Method of Teaching.

1.7.2. SAMPLE

Two intact classroom groups of 50 standard VII pupils each (Total 100 pupils) from two schools in Palakkad district were selected as the sample. These two groups were equated with regard to some select variables. One of these groups (50 pupils) was treated as the ***Experimental group*** and the other (50 pupils) as the ***Control group***.

1.7.3. TOOLS USED FOR TREATMENT

In the present study, the following tools were used for treatment.

1.7.3.1. Lesson Transcripts for Cooperative Learning Strategy (Jigsaw-II Model)

Lesson Transcripts for Cooperative Learning Strategy (Jigsaw-II Model) were prepared by the investigator as per the suggestions of Aronson, *et.al.* (1978) and Slavin (1980). Twenty seven Lesson Transcripts were prepared for twenty seven periods (each of 90 minutes duration). In each Lesson Transcript there are four consecutive phases.

Phase I. Formation of Base groups and the presentation of the goal as a group goal.

Phase II. Formation of Expert groups to facilitate and encourage the sharing of materials.

Phase III. Return to the Base group and peer teaching.

Phase IV. Reward the group for successful completion of the task.

1.7.3.2. Lesson Transcripts for Conventional Lecture Method of Teaching

The investigator prepared Lesson Transcripts for teaching through the Conventional lecture Method, on the basis of principles of objective based instruction followed in almost all the primary schools in Kerala. Fiftyfour Lesson Transcripts were prepared for fifty four periods (each of 45 minutes duration) with a view to equalise the treatment duration.

1.7.4. OTHER TOOLS USED

Other tools used for the present study are the following.

1.7.4.1. Classroom Environment Inventory (CEI)

The Classroom Environment Inventory prepared by Pillai and Sunitha (1996) was used to measure pupils' perceptions of their Classroom Environment. 50 items (all are in the form of statements) have been included in the inventory.

1.7.4.2. Verbal Group Test of Intelligence (VGTI)

In the present study, the Control Variable, Verbal Intelligence was measured by the ***Verbal Group Test of Intelligence*** developed and standardised by Kumar, *et al.* (1997).

1.7.4.3. Standard Progressive Matrices Test (SPMT)

The standard form of the Raven's Progressive Matrices Test (Raven, 1958) was used to measure the Control Variable, Non-verbal Intelligence. The test consists of five subtests of twelve items each. It is a popular measure of the 'g' factor of intelligence.

1.7.4.4. Achievement Test in Malayalam Language (ATML)

In order to determine the effectiveness of Instructional Learning Strategies (Cooperative and Conventional) an Achievement Test in Malayalam Language was prepared by the investigator on the topics selected for treatment. The present test is based on the ***Taxonomy of Educational Objectives*** suggested by Bloom (1979). This test was used to determine the Achievement as well as Retention in Malaylam Language. It was also used as the Pretest to measure the Control Variable, ***Pre-experimental Status in Achievement.***

1.7.4.5. General Data Sheet for Assessing Socio-Economic Status (SES)

To measure the Socio-Economic Status (SES) of the sample of both the Experimental and Control groups, and thus to equate both the groups in terms of SES, a General Data Sheet was used. In the Data Sheet there are nine columns each for father and mother of the student through which information about their education, occupation and income can be collected.

1.7.4.6. Classroom Interaction Rating Scale (CIRS)

A Classroom Interaction Rating Scale was prepared to investigate the nature of classroom interaction under the Cooperative situation and the Conventional situation (Lecture Method).

1.7.5. STATISTICAL TECHNIQUES

The following statistical techniques were used for the analysis of data in the present study.

1.7.5.1. Mean Difference Analysis

Test of Significance of Difference between Means was used to compare the relevant variables between the Experimental and Control groups. This statistical technique was mainly employed to study whether the Experimental and Control groups differ in Achievement, Gain and Retention scores without controlling the effects of the Covariates. Mean Difference Analysis was also employed to equate the Experimental and Control groups with regard to the Pre-experimental Status, Verbal and Non-verbal Intelligence and Socio-Economic Status of the pupils. To compare the nature of interaction in the Cooperative and Conventional classrooms, this technique was resorted.

1.7.5.2. Analysis of Covariance(ANCOVA)

Two Factor ANCOVA employing three Covariates (separately and in combination) was used to control the effects of the Covariates viz., Pre-experimental Status of the pupils (Pre test score), Verbal Intelligence and Non-verbal Intelligence. This was done to confirm the effectiveness of Cooperative Learning Strategy (Jigsaw-II Model), if any, over the Conventional lecture Method of Teaching.

1.7.5.3. Two-way Analysis of Variance (ANOVA) with 2x2 Factorial Design

To study the main and interaction effects of the Independent Variables on the Dependent Variables, Two-way ANOVA with 2x2 Factorial design was used. In the 2x2 Factorial design, two levels of Instructional Learning Strategies (Cooperative Learning - Jigsaw II Model and Conventional lecture Method) and two levels of Classroom Environment (Above Average Classroom Environment - AACE and Below Average Classroom Environment - BACE) were utilised.

1.7.5.4. Scheffé Test of Post-hoc Comparison

Scheffé (1959) Test of Post-hoc Comparison was used to compare the criterion means of the Experimental and Control groups, to determine the group difference.

1.8 SCOPE AND LIMITATIONS OF THE STUDY

By the present study the investigator aimed at examining the influence of Instructional Learning Strategies (especially Cooperative Learning over Conventional lecture Method of Teaching) and Classroom Environment on Achievement and Retention in Malayalam Language of standard VII pupils. Appropriate standardised tools with proven psychometric properties were used to collect the data. The sample was two intact class divisions of standard VII pupils. The investigator hopes that the results of the study may help the teachers and other educationists to modify the teaching learning programme.

But some limitations are anticipated by the investigator which are given as follows.

1.8.1. The study was confined to a small sample of two intact class divisions of standard VII, as this was considered as the representative of primary school pupils.

1.8.2. Although all of the Sociological Variables (such as Classroom Environment, School Environment and Home Environment) are important in students' learning, Classroom Environment only was selected as one of the Independent Variables.

1.8.3. Only one among several Cooperative Learning Strategies (Jigsaw-II Model) was experimented in the present study.

1.8.4. The study was limited to Malayalam Language only.

1.8.5. The number of Independent Variables was limited to two only (Instructional Learning Strategies and Classroom Environment).

1.8.6. Although there are several sophisticated Experimental Designs such as Multiple-Group Pretest-Post test Design, Multiple-Group Time Series Design, Regression Discontinuity Design, etc., the Pretest-Post test Equivalent-Groups Design was selected for the present study.

1.8.7. The effectiveness of Cooperative Learning Strategy over Conventional lecture Method of Teaching was measured in terms of Academic Achievement and Retention only. Other aspects of learning (such as psychological development, social development etc.) were not considered.

1.8.8. The statistical technique ANCOVA was employed only for the Total sample. The sub-samples such as Boys and Girls were not considered in ANCOVA.

1.8.9. The whole ANCOVA process was done by controlling the effects of three Covariates separately and in combination of the three at a time. The combined effect of two covariates in turn were not considered in the ANCOVA process.

1.8.10. The term used in the title, ***Instructional Learning Strategies*** is a very broad concept. But under this title, only two Instructional Learning Strategies (Cooperative Learning Strategy and Conventional lecture Method of Teaching) were experimented by the investigator.

1.9. ORGANISATION OF THE REPORT

The organisation of the present research report is given as follows. Each chapter is explained in relevant sub-units.

Chapter I **INTRODUCTION**

A Brief Introduction of the Problem
Need and Significance
Statement of the Problem
Definition of Key Terms
Variables
Objectives
Hypotheses
Methodology
Scope and Limitations of the Study
Organisation of the Report

Chapter II **REVIEW OF RELATED LITERATURE AND META ANALYSIS**

Theoretical Overview of the Variables
- Instructional Learning Strategies
- Classroom Environment

Review of Related Studies
- Studies on Cooperative Learning and Achievement
- Studies on Cooperative Learning and Retention
- Studies on Classroom Environment and Achievement

Meta Analysis

Chapter III **METHODOLOGY**

Selection of Variables
Objectives and Hypotheses
Design of the Study
Procedure
Summary of Procedure

Chapter 2

REVIEW OF RELATED LITERATURE AND META ANALYSIS

- **Theoretical Overview of the Variables**
  - Instructional Learning Strategies
  - Classroom Environment
- **Review of Related Studies**
  - Studies on Cooperative Learning and Achievement
  - Studies on Cooperative Learning and Retention
  - Studies on Classroom Environment and Achievement
- **Meta Analysis**

2 REVIEW OF RELATED LITERATURE AND META ANALYSIS

By the present study, it is aimed at examining the ***influence of Instructional Learning Strategies and Classroom Environment on Achievement and Retention in Malayalam Language of standard VII pupils***. To get a theoretical understanding of the variables in the present study, the investigator made an attempt to review almost all the available studies in this area upto the year 2002. The review of literature is classified and presented under the following headings.

2.1 THEORETICAL OVERVIEW OF THE VARIABLES

2.1.1. INSTRUCTIONAL LEARNING STRATEGIES

2.1.2. CLASSROOM ENVIRONMENT

2.2. REVIEW OF RELATED STUDIES

2.2.1. STUDIES ON COOPERATIVE LEARNING AND ACHIEVEMENT

2.2.2. STUDIES ON COOPERATIVE LEARNING AND RETENTION

2.2.3. STUDIES ON CLASSROOM ENVIRONMENT AND ACHIEVEMENT

2.3. META ANALYSIS

2.1. THEORETICAL OVERVIEW OF THE VARIABLES

A theoretical overview regarding ***Instructional Learning Strategies*** and ***Classroom Environment*** is presented in this section.

2.1.1. INSTRUCTIONAL LEARNING STRATEGIES

To present the theoretical idea of the term ***Instructional Learning***

Strategies, the investigator found it inevitable to describe certain related terms such as ***Teaching and Instruction; Methods, Models and Strategies of Teaching.*** In the educational context, educators, researchers and teachers are using these terms with interchangeable meaning. But a keen examination of the meanings will reveal the narrow difference between the terms in the context of application. In the following part of this section the investigator attempts to differentiate these terms.

2.1.1.1. Teaching

For every human being learning seems as natural and familiar as breathing or eating. It is a continuous, never-ending process that extends from the womb to the tomb. It is an active recognization of an existing pattern of meaning. It makes a change in our behaviour. Most of what we do or do not do is influenced by what we learn and how we learn it. Learning, therefore, provides a key to the structure of human personality and behaviour. Even though, for sometimes, learning becomes problematic for the individual. In such situations the individual should be helped to overcome those problems. This help can be termed as ***Teaching.***

Teaching in the context of education is a social event in which human beings come to share meaning of experience. In the traditional concept, a teacher is an authority from whom the knowledge comes out and the learner receives it. But new knowledge alone will not change the meaning of experience or behaviour. For this, some work should be done to link the new body of knowledge with the existing experience. Hence knowledge given out in the form of ***bodies of knowledge*** is not the highly selected knowledge needed for teaching (Koushik & Sharma, 1997).

Teaching is a system of actions which induce learning. John Brubacher defines teaching as ***an arrangement and manipulation of situation in which there are gaps or obstructions which an individual will seek to overcome and from which he will learn in the course of doing so.***

The term teaching is originated from a Latin word ***Taikjon,*** the meaning is to show how? This is what the teacher in the classroom does. He/She has to show the students what the curricular materials are and how they are organised, how facts become concepts, laws and principles, how they are associated and dissociated. For this purpose, the teacher has to resort many materials, tactics and methods. This activity is the Teaching which ultimately aimed to create some kind of change in ***behaviour*** of the target persons - the students. This activity can be initiated and progressed toward the end results in a ***formal*** **or** ***informal*** set up. If it is in a formal set up, it is called as classroom ***Teaching.*** All the formal infra-structure is there - the classroom, the teacher, students, curriculum, syllabus, timetable and administrators etc.

During the process of teaching either in a formal or informal set up, the end results viewed as the change of behaviour of the target group (probably students) in the positive ***appreciable direction.*** As a result of teaching the target group may or may not learn; may think or may not think; may do or may not do certain activities. Whatever it be the quality and quantity of this end result, knowledge (curricular materials in the case of classrooms) is transacted through the teacher to the target group (students in the case of classrooms). This explanation of Teaching is more explicit and all inclusive. It permits the accessory explanation as those who transact knowledge to a target group (to a single person also) became a Teacher and his/her activity to

transact the knowledge in Teaching. If this activity is looked through a pedagogic sense the meaning will be true. The meaning and activity of the term teaching thus elevated to a noble position as in an educational context, the whole classroom processes are generally delimited to a single term Teaching.

The teacher whether in the formal or informal set up has the ***unlimited freedom*** to change his/her tactics to make the behaviour of the target group to change (Kumar & Bindhu, 2002). He/she can adapt any particular mixture or an amalgam of tactics. The ***ways*** and ***means*** are not so much structured and definite. According to the ***need of the situation*** the Teacher can change his/her methods. The importance is given to the end results.

2.1.1.2. Instruction

Instruction is often used synonymously with Teaching. But, like Teaching, Instruction is ***not having*** a wider, all inclusive meaning. It reflects its meaning in a ***limited way*** characterised by very specific behavioural patterns of the one who instructs.

Instruction includes ***all*** the activities of Teaching and is carried on a ***very formal*** set up. In that sense Instruction has its own formal infrastructure. In the present context of discussion, it is performed in a classroom. The person who instruct the target group - the instructor - ***directs*** what to do or what not to do. This element of ***direction*** or ***command*** predominates in the act of instruction, delineate it from Teaching. Instruction includes teaching. The instructor organises the curricular materials and show the target group (students) how the materials are associated and how facts become concepts, laws, and principles. But this '***Show How***' is carried out by an instructor

through a very sequential and predetermined behavioural expressions, predominated by the tint of command and direction. Thus the instructor is able to elevate the target group to the position of pre-determined behavioural acquisition in a very strict sense. All teaching is ***not*** instruction; but Instruction ***includes*** teaching.

In instruction, the sequential and systematic activities adopted by the instructor is characterised by their ***definitness*** and ***pattern***. The instructor instructs the target group through a definite ***plan of action*** other than in Teaching. Thus the instructor has limited freedom to switch over to a new ***technique***. The end result of Instruction is the same as aimed by teaching. But the ***ways*** and ***means*** are having a slight difference. They are much more ***structured*** and ***definite*** than in Teaching. In Instruction, both the end results and the ways and means are equally important. This dual importance makes the act of Instruction more ***structured*** **and** ***definite*** (Kumar & Bindhu, 2002).

Like the term Teaching and Instruction, at times educators, educational planners, policy makers and educational administrators synonymously use ***Teaching Methods*** and ***Teaching Strategies***. The ***ways*** and ***means*** adopted by the teacher in the classroom to attain the desired end results are pedagogically known as Teaching Methods. But recently the term ***strategy*** is also used to denote the very same ways and means for student attainment in the classroom. So, a very clear demarcation is inevitable to understand the concepts of Teaching Methods and Teaching Strategies.

2.1.1.3. Teaching Methods

In the teaching learning process, teacher's knowledge about teaching is very important. It is as important as teacher's knowledge in the subject-

matter. A rational ordering and balancing of the teaching material and classroom activities in the light of the purpose of learning would help the teacher to make the material presentation effective. Such rational ordering can be called a ***method***.

A method cannot exists as a discrete entity, rather, it is a direct function of some factors such as educational purpose, subject-matter, the nature of the pupil, school policy, home background, past educational experience, teacher's beliefs about learning etc. Considering all these factors, a teacher can preplan his/her work in the classroom. Good (1973) defines teaching method as a standard procedure in the presentation of instructional material and the content of activities. The concept of ***Instructional Methods*** has a history of thousands of years (especially in India and Greece). Several kinds of teaching methods were developed so far. Some of them are Lecture method, Lecture-demonstration method, Question-answer method, Play-way method, Project method, Discussion method, etc.

The purpose of adopting each and every method is very clear to educators and educational researchers. It is nothing but to create certain desirable change of behaviour in case of students through transaction of the school curriculum. This transaction is done in the classroom between the teacher and the taught through a series of ***planned activities*** performed by the teacher in the classroom. Those planned activities serve the teacher in the form of ***tactics*** to communicate the curriculum is the method of teaching. Method of Teaching creates only a kind of ***direct effect*** on the target group. A direct effect is the effect of transacting the curricular materials (Teaching). It is the ***outcome*** of teaching pedagogically called by teachers as the learning ***achievement***. To this learning achievement Psychologists give a more broad

explanation as the ***change of behaviour***. In teaching methods, the main aspect is the way of transacting the content.

All methods of teaching are flexible. At any point in the development of a curricular material, the teacher has the freedom to switchover to any other methods according to the ***need*** of the context of teaching (Kumar & Bindhu, 2002). Teaching methods are built up on explicit theoretical foundations. But, recently research on teaching has shown more effective variations from the age old teaching methods as in the case of Models of Teaching and Strategies of Teaching.

2.1.1.4. Models of Teaching

Learning is purely individualistic. No teacher can teach his/her students. But, the students can learn. What the teacher does in the classroom is to ***direct*** and ***stimulate*** student learning and show the student how the materials are ***organised***. What the students learn mainly depend on what they ***themselves do***. Student learning is the performance of individualised ***tactics, techniques*** and ***strategies*** in learning. A model of teaching ***imparts*** those tactics, techniques and strategies to the students unlike the method of teaching. A model helps them to learn ***how to learn*** and there by paving the way for ***develop*** themselves. A model of teaching is a plan or pattern of teaching that teachers use to design ***face to face*** teaching in the class or tutorial settings and to ***shape*** instructional materials like books, films, tapes, programmes and the like (Joyce & Weil, 1992). Teaching models are just instructional designs. They describe the process of specifying and producing particular environmental situations which cause the students to interact in such a way that specific change occurs in his behaviour. The main postulate of teaching model is that learning outcome can be classified into distinctive

categories and each objective can be achieved by generating specific situations. In a model only a suggested pattern is to be tried out. A single model of teaching normally includes a number of ***teaching strategies*** based upon different theoretical aspects of the psychology of learning. A model tells the teacher ***how to teach*** a curricular material using different strategies of instruction. The teacher will also get the clear idea of ***how students learn*** in accordance with the strategies used by the teacher. The end result of a model of teaching is ***not only*** the direct, academic effect in the form of student Achievement but also it will produce some kind of ***nurturant effects*** - indirect effects upon the students mainly taken place in the affective domain (Kumar & Bindhu, 2002).

A teaching model has a number of characteristics. These include the basic assumptions upon which the model is built-up such as creation of a learning environment, strong interaction between the teacher and the students and the planned use of appropriate strategies. It presents appropriate experience to the teacher and the taught. A model gives answers to the fundamental questions like, how does the teacher behave?, how the strategy is organised?, what is the nature of the teacher-pupil interaction? and what are the support materials? etc. A model of teaching is designed on the basis of individual difference in the process of learning. Generally a model of teaching encompasses the following fundamental characteristics.

Syntax : It is the sequentially arranged teacher-student activities completed in different phases.

Social system : It tells us the nature of teacher-pupil relationship.

Principles of reaction : This highlights the behaviour of the teacher towards the students.

Support system : These are the materials and resources (human or non-human) used by the teacher to develop a model of teaching.

Models of teaching aim at the total development of the learner. For this purpose a variety of models have been developed so far. Joyce and Weil (1992) have categorised these models into four families such as The Social Family, The Information-Processing Family, The Personal Family and The Behavioural System Family.

2.1.1.5. Strategies of Teaching

Strategy is relatively a new concept in education. Actually this term is used in the warfront with a view to take control over the target group. Each and every action is predetermined, practised and implemented effectively. Each and every step is ***strategic*** to win over the enemies and very crucial in the forward movement of the troops. Due to the peculiar characteristics of the term strategy, educationists and researchers, skillfully borrowed the term from the war personnels and used in the classroom transactions. As a result a fundamental ***change*** occurred with regard to Teaching Methods.

To create desirable change of behaviour of the students in the classroom, all activities of the teacher are to be strategically designed with utmost precision and effectiveness. Methods of teaching is the ***general plan of action*** of the teacher. At the same time strategies of teaching is more ***clearcut specific, pre-planned*** activities which have very definite point of starting, progress and ending (Kumar & Bindhu, 2002).

In each Teaching Strategy a very strong theoretical footing is inevitable. The teacher's activities are designed on the basis of the strong theory developed out of continuous experiments. A teacher can practise one or more than one strategy at a time to produce desired, predetermined outcomes.

In meaning, as well as in practice, Instructional Learning Strategies hold an additional dimension rather than Teaching Strategy. It includes instructional strategies as well as learning strategies adopted by the students.

Stones and Morris (1977) defined Instructional Learning Strategy as a ***generalised plan for a lesson which includes structure, desired learner behaviour in terms of goals of instruction and an outline of planned tactics necessary to implement the strategy. Lesson strategy is a part of a large developmental scheme in the curriculum.***

Implementing Instructional-Learning Strategies in the classroom make the teachers to view and understand the classroom process from two dimensions: from their point of view ***how to teach***; and from the perspective of students to learn ***how to learn***. That is, the learners are instructed to learn how to learn. Preplanned situations are created purposefully in the classroom through which the learners are led to preplanned goals. Instructional Learning Strategies can be divided generally into two types.

a. Autocratic Strategies

These are traditional strategies of instruction, ***content oriented*** and ***teacher centered.*** The teacher is the supreme authority in the class and he/she enjoys the freedom to take decisions against any issues and to implement. Students are ***passive learners.*** Imposing knowledge forcefully is done by the teacher while using the autocratic strategies. The strategy itself ***suppresses*** the

learner interest, attitudes and needs. These strategies mainly aimed for the ***cognitive and psychomotor*** development of the learner not for the development of ***affective characteristics. Lecture, Demonstration, Tutorials, Programmed Instruction*** and the like are some of the autocratic strategies. The Conventional lecture Method was selected as one of the Instructional Learning Strategies for the present experiment.

b. Democratic Strategies

As the name indicates, the strategies came under this category will have ***democratic*** characteristics. The teacher is not ***dominated.*** Teacher and students have ***equal*** importance. These strategies are ***pupil oriented and*** exclusively designated for the ***cognitive, affective*** and ***psychomotor*** development of the learner. The role of the teacher and the learner is more specified and highlighted in most of the democratic strategies. Development of the constructive ***social capacity*** is the added quality of these type of strategies. Democratic strategies include ***Discussion, Discovery, Heurism, Project, Group tutorials, Brain storming, Role playing, Independent study, Sensitivity training, Cooperative procedures and Peer tutoring*** and the like. Teaching strategies can be planned for individual learning, small group learning and large group learning, each make a different assumption about the nature of the learners. For individual learning, strategies such as Programmed Instruction are adopted, for small-group learning, Cooperative Learning Strategies are used, and for large group learning, Conventional Teaching Strategies such as Lecture Method and Lecture-Demonstration Method are used.

In the developed countries, during the last two or three decades, a new trend has been arised in the educational field, that is, a shift from the large

group learning and individual learning to the small group learning. Learning through small cooperative groups were promoted with a view to make use of the strong human instinct - to cooperate with others - in the learning process. Many Instructional Learning Strategies were developed for using in the small cooperative groups. These were generally called Cooperative Learning Strategies.

2.1.1.6. Cooperative Learning

The concept of Cooperative Learning refers to instructional methods and techniques inwhich students work in small groups (four to six members) and are rewarded in some way for performance as a group. Many studies in western countries revealed that using Cooperative Learning as an instructional strategy, teachers can overcome the major difficulties of the conventional methods of teaching. Cooperative Learning Strategy is based on the psychology of cooperation among students in the class. In Cooperative Learning, students are to work together for a common goal, motivating themselves by depending others, encouraging each others during the task of learning and by increasing positive contact among group members.

Studies on small group methods of teaching have given special attention to cooperation as a necessary social condition for learning. Thus, in the 1980s small group methods of teaching got increased attention in developed countries. These are methods usually directed towards increasing cooperation in learning. Principles of cooperation have been applied for many years in industry, in military, sports and in other human endeavour. They have also been used in education for a long time, but their use has tended to be occasional and informal. Systematic Cooperative Learning programmes used as the principal means of delivering instructions were developed in the

early 1970s. The rationale for this new emphasis was on cooperation among the students in the classroom and a profound dissatisfaction with the traditional instructional system.

The idea behind Cooperative Learning method is that when groups rather than individuals are rewarded, students will be motivated to help one another to master academic materials. Cooperative Learning methods have also been found to improve group relations in desegregated classrooms, acceptance of mainstreamed academically handicapped students by their classmates, development of student self-esteem and other affective outcomes.

The theory on which Cooperative Learning methods are based is quite old and well established in social psychology. There is a basic relationship between cooperation and social perspective of the individual which has great deal of social psychological basis. Social perspective is the ability to put oneself in the place of others and understand their perspective on the situation.

2.1.1.7. Why Cooperative Learning?

All people are members of a number of small groups - the family, the office or department, the circle of friends at the club - and the membership of these groups is perhaps the single most important factor in human lives. Certainly it is through ***membership*** of these groups that human lives and attitudes are shaped and modified. People find it easier to see themselves as members of small groups of this kind than of society as a whole.

The phenomenon explained earlier exists in the educational field also. Pollard, *et al.* (1994) argue for a balance between ***whole-class instruction and completely individualized work,*** ie learning through small cooperative

groups should be promoted. Johnson and Johnson (1998) are also of the same opinion, because according to them, ***scholarship and learning do not exist in isolation, they are products of a community and a culture characterised by mutual respect and trust.*** Johnson and Johnson (1998) have added that working cooperatively with peers, resolving conflicts constructively and internalizing prosocial values are experiences that all students need. Bacharach, *et al.* (1995) have identified that ***cooperative groups reflect the skills and attitudes, the children will need to contribute to society as adults.*** Moreover, plenty of research work have noted that ***Cooperative Learning Strategies ensure higher Academic Achievement*** (Slavin, 1990; Shacher & Sharan, 1994; Brauer, *et al.*, 1997; Golda, 1999; Bindhu, 1999 and Kumar & Hameed, 2000).

But unfortunately, survey of studies evidence that teachers are presently ***overusing competition, possibly misusing the individualistic goal structure and underusing cooperation in their classrooms.***

2.1.1.8. Cooperative Learning and Traditional Instruction

Learning can be structured ***competitively,*** so that students work against each other; ***individually*** so that students work alone; or ***cooperatively*** so that students work together to accomplish shared learning goals. Structuring situation competitively results in ***individual opposing each other's success***. Structuring situation ***individualistically results in no interaction among individuals*** and structuring situation ***cooperatively results in individuals promoting each other's success*** (Johnson & Johnson, 1998), ie a ***negative interdependence*** exists when individuals work against each other, a ***neutral interdependence*** exists when individuals work alone and a ***positive interdependence*** exists when individuals work together.

In the traditional competitive classroom the purpose of learning process and its evaluation is to ***rank students from the 'best' to the 'worst'.*** In most of the classrooms a fairly stable pattern of Achievement exists so that the majority of students always ***lose*** and a few students always ***win.*** Thus a student may spend ten to twelve years in schools carrying the complex of a ***loser.*** It would lead to a sense of ***worthlessness, helplessness*** and ***incompetence.*** On the otherhand, when small cooperative groups are formed and utilised for learning, it can be found that almost all of the students take part in the activity for ***achieving the common goal*** (Sasidharan, 1997; Hameed, 1997; Golda, 1999).

Competition tends to ***discourage*** students from helping each other, where as cooperation ***encourage*** it (Slavin, 1990). The interaction in an authoritative or teacher dominated whole class apparoach is basically a ***one-way street*** from teacher to student. For the authoritative teacher, classroom success is often measured by the amount of notes the students take and by the ability to repeat and relate this material in ***subsequent examination*** (Vashist, 1997). In Cooperative Learning, emphasis is given ***not only upon Academic Achievement but also upon social and psychological development*** (Benard, 1990).

For the development of language skills, classroom interaction is a must. But the traditional method makes ***no provision*** for active classroom interaction in which to use the language (Joseph, 1998). Meanwhile, student interaction is the ***basic principle*** of Cooperative Learning. So, Manarino-Leggett and Salomon (1990) describe Cooperative Learning as suitable for the language classroom.

Because of the popular criticism of competition and the dissatisfaction of teachers with the destructive effects of overusing competition, ***individualized instruction*** has been presented as the alternative. But all of the individualized approaches such as Programmed Learning, Contracting, Mastery Programmes and Tutorial Programmes, would require ***so much work*** from the teacher that it seems impossible to implement as a total or even, major approach to teaching. It takes a great deal of ***teacher time and effort*** to construct an individualized classroom. In Cooperative Learning the role of the teacher is that of a ***facilitator*** only. The students take responsibility for their own learning, the teacher load is minimised (Varaprasad, 1997).

Under individualistic goal structure, ***little interaction*** will take place among students. Interpersonal and group skills will not be learned and utilized, student friendship and support system will be minimised and student ***loneliness*** and ***alienation*** will result. All the affective outcomes resulting from interaction with other students will be lost. Thus the process of learning creates new undesirable outcomes and consequences which may increase student ***dislike*** for schooling and student ***dissatisfaction*** with instruction. Moreover several studies throw light on the fact that individualised instruction ***will not increase the*** effectiveness of schooling (Fraser & Walberg, 1984; Mc Donald, *et al.*, 1987 and Felder, 1995). In Cooperative Learning, the students work in ***cooperative groups***. Working with others especially with one's friends is obviously ***more attractive*** and effective to many than the loneliness of working ***in isolation.*** It can add a new dimension to work. The pupil enjoys it and it reduces the level of boredom.

In the light of so many post studies conducted, Bennett and Dunne (1992) regard cooperative group work as an ***acceptable and manageable***

compromise between whole - class work and wholly individualized work. The former is seen as unacceptable because it is undifferentiated, the latter is seen as unworkable because there are insufficient resources of time, materials and teaching staff to render this practicable.

2.1.1.9. Essential Components of Cooperative Learning

Cooperative Learning is ***more than just group work.*** According to Lee (1997) ***in traditional group learning, students work in groups with no attention paid to group functioning, where as in Cooperative Learning, group work is carefully prepared, planned and monitored.*** It is the instructional use of small groups so that students ***work together*** to maximise their own and each other's learning.

Johnson, *et al.* (1993) describe, ***Positive interdependence, Face-to-face promotive interaction, Individual and group accountability, Interpersonal and small group skills and Group processing*** as five essential components of Cooperative Learning. These components are briefly described in this section.

I. Positive Interdependence

The first and most important element in structuring Cooperative Learning is positive interdependence. It is successfully structured when group members perceive that they are linked with each other in the way that one ***cannot succeed unless everyone succeeds.*** Group goals and tasks, therefore must be designed and communicated to students in ways that make them believe they ***sink or swim together.*** When positive interdependence is solidly structured it highlights that ***(a) each group member's efforts are required and indispensable for group success and (b) each group member has a unique contribution to make the joint effort because of his or her resources*** or

role and task responsibilities. Doing so, creates a commitment to the success of group members as well as one's own and is the ***heart of Cooperative Learning***. If there is no positive interdependence, there is ***no cooperation*** (Johnson & Johnson, 1998).

II. Face-to-Face Promotive Interaction

Students need to do real work together in which they promote ***each other's success*** by ***sharing*** resources and helping, supporting, encouraging and applauding each other's efforts to ***achieve***. There are important cognitive activities and interpersonal dynamics that can only occur when students ***promote each other's learning***. This includes orally explaining how to solve problems, teaching one's knowledge to others, checking for understanding, discussing concepts being learned, and connecting present with past learning. Each of these activities can be structured into group task directions and procedures. Doing so helps to ensure that Cooperative Learning groups are both an ***academic support system*** (every student has someone who is committed to helping him or her learn) and a ***personal support system*** (every student has someone who is committed to him or her as a person). It is through promoting each other's learning face-to-face that members become personally committed to each other as well as to their mutual goals.

III. Individual and Group Accountability

Two levels of accountability should be structured into cooperative lessons. The ***group*** must be accountable for achieving its goals and ***each member*** must be accountable for contributing his or her share of work. Individual accountability exists when the performance of each individual is

assessed and the results are given back to the group and the individual in order to ascertain who needs more assistance, support and encouragement in learning. The purpose of Cooperative Learning groups is to make each member ***a stronger individual*** in his/her right. Students learn together so that they subsequently can gain greater individual competency.

IV. Interpersonal and Small Group Skills

The fourth basic element of Cooperative Learning is teaching students the required ***interpersonal and small group skills.*** Cooperative Learning is inherently ***more complex*** than competitive or individualistic learning, because students have to engage simultaneously in task work (learning academic subject matter) and team work (functioning effectively as a group). Social skills for effective cooperative work magically appear when cooperative lessons are employed. Instead, social skills must be taught to students just as purposefully and precisely as academic skills. Leadership, decision making, trust building, communication and conflict management skills empower students to manage both team-work and taskwork successfully. Since cooperation and conflict are inherently related (Johnson & Johnson, 1995), the procedures and skills for managing conflicts constructively are especially ***important*** for the long term success of learning groups.

V. Group Processing

Group processing exists when group members discuss how ***well they are achieving*** their goals and maintaining ***effective working relationships***. Groups need to describe, what members actions are helpful and unhelpful and make decision about what behaviour to continue or change. Continuous improvement of the processes of learning results from the careful analysis of

how members are working together and determining how group effectiveness can be enhanced.

2.1.1.10. Different Cooperative Learning Strategies

Even if the ultimate aim is the same - to promote cooperation among students and thereby achieving better results - there are different types of Cooperative Learning Strategies. Some of them are briefly described in the following section.

I. Learning Together (LT)

Learning Together (LT), developed by Johnson and Johnson (1975) utilizes a ***Cooperative goal structure*** that requires mutual acceptance of common goal by group members and that minimizes individualistic striving. The two distinctive features of this method are; **(a)** Students are sensitized toward and receive training in human relation skills necessary for group functioning and **(b)** only one completed product or outcome is submitted from each working group and the participation of each group member in that product is expected.

II. Group Investigation (GI)

This Cooperative Learning Strategy was developed by Sharan and Sharan (1976). Two additional features that give the GI approach distinctiveness among general Cooperative Learning Strategies are; **(a)** Each student group is expected to present a report, demonstration or display to the rest of the class and **(b)** in addition to the teacher's evaluation of group's work, students themselves are involved in assessment procedure either by direct comment on their peers by contributing questions to a common test or by self evaluation of their own.

III. Student Team Learning

Among different Cooperative Learning Techniques, Student Team Learning methods are the most extensively researched and widely used. Three of the Student Team Learning methods are now in widespread use. These are ***Jigsaw Learning I & II, Teams-Games-Tournaments (TGT) and Student Teams Achievement Divisions (STAD).*** A fourth technique, ***Team Assisted Individualisation (TAI)*** has been developed recently. These methods are described in the following part.

a) Jigsaw Learning - I

In Jigsaw Learning, developed by Aronson, *et al.* (1978), a learning task is jigsawed or cut into pieces that when fitted together recreate the total picture. Each group of five or six students get a complete set of task sections and each student in the group takes the responsibility for one of these sections. After learning the sections of material, discussions take place in ***expert groups*** for strengthening learning. After discussion the members are returned to their ***base groups*** and tutor other members of the group and are tutored in turn by them. Tests are taken individually over the whole of the material. Individual grades are given to students after taking individual quizzes.

b) Jigsaw - II

Slavin (1980) found the individual incentives in Jigsaw-I as a demerit, so that it would promote competition rather than cooperation. So he made a modification in Jigsaw-I and then incorporated it in the Student Team Learning Programme. In this method called Jigsaw-II, instead of each student having a unique section, all students read a common narrative, such as a book

chapter or a short story. However, each student is given a topic on which to become an expert. The students who have the same topic meet in ***expert groups*** and return to their teams. Then students take individual quizzes, which are formed into team scores and the highest scoring teams and individuals are recognised in a class news letter.

c) Teams - Games - Tournaments (TGT)

This strategy was developed by DeVries, *et al.* (1980). The procedure is identical to STAD in all respects except one. The testing is carried out in a ***game*** composed of three students, each drawn from a different original study team. The students ask questions to each other in turn. Points are awarded for correct answers. The earned points for each student are contributed to the total for the study team, and the team totals are compared competitively.

d) Student Teams Achievement Divisions - STAD

In STAD, developed by Slavin (1983a) classroom teams of four or five students study together, frequently quiz and tutor each other with specifically assigned material for the current topic. At designated times the students take individual tests, and each student on the basis of improvement from the previous test, contribute points to the study team total. Team totals are then tabulated and compared competitively with each other.

e) Team Assisted Individualisation (TAI)

Team Assisted Individualisation (TAI) is the most recent development of Student Team Learning methods (Slavin, *et al.*, 1984). It is a combination of team learning and individualised instruction applied to the teaching of mathematics. Students follow a regular sequence of activities, involving reading an instruction sheet. Team-mates work in pairs, exchanging answer

sheets and checking each other's skill sheets and checkouts. Students' test scores and the number of tests they can complete in a week go into team score and team members receive certificates for exceeding pre-test team standards. TAI is unique among all Cooperative Learning methods in its use of individualised instead of class paced instruction (Slavin, 1985).

IV. Numbered Heads Together (NHT)

Numbered Heads Together is a recently developed Cooperative Learning Strategy. It was developed by Olsen and Kagan (1992). There are four steps in this strategy. (**a**) Each student in a group of four gets a number 1, 2, 3 or 4. (**b**) The teacher or a student asks a question based on the text, the class is reading. (**c**) All members in the group put their heads together to come up with an answer or answers and (**d**) The teacher calls a number from one to four. The person with that number answers for the group.

V. Think Pair Share (TPS)

Think Pair Share (TPS) is a recent mode of Cooperative Learning developed by Andrini (1994). In this model, students pair with a partner to share their responses to a question. Students are then invited to share their responses with the whole class. There are a variety of ways to share, including stand up and share - everyone stands up and as each student responds he or she sits down. Any one with a similar response also sits down. It will continue until everyone is seated or do a ***quick whip*** through the class in which students respond quickly one right after another.

VI. Complex Instruction (CI)

This Cooperative Learning Strategy was developed by Cohen (1998). The programme is a set of Cooperative Learning approaches focused on

Spanish bilingual students. It provides students with a series of activity cards on English and Spanish, which direct them to do experiments, take measruements, solve problems and so on. Students work in small heterogeneous groups to do experiments and answer the questions intended to evoke high level thinking and build language fluency in first Spanish then English. Complex Instruction adds to a group structure, in which students take on specified roles and learn group process skills. It emphasises positive expectations for all students.

VII. Turn to Your Neighbour (TYN)

In the Cooperative Learning method, Turn to Your Neighbour, a student pairs up with another student to discuss an idea, to write or to draw as instructed by the teacher. They may be asked to share their work with the class.

VIII. Pairs of Pairs (PP)

In Pairs of Pairs students write out a list of responses to a statement such as all the states and their capitals they know. They first work in pairs and make one list. Two pairs get together and make a single combined list. All the members of the groups are responsible to know what is in the list.

IX. Inside-Outside Circle (IOC)

In this Cooperative Learning method, students stand in pairs in two concentric circles. The inside circle faces out; the outside circle faces in. Students respond to teacher's questions as they rotate to each new partner.

X. Other Cooperative Learning Methods

There have been a few interesting studies on Cooperative Learning Methods other than the strategies described earlier. Starr and Schuerman

(1974) used a relatively simple method in which groups of as many as eight students considered science questions and then reported back to the entire class. Wheeler (1977) developed a Cooperative Learning Technique in which students were assigned specific roles (such as co-ordination, recording etc.) within cooperative groups and worked on social studies inquiry activities to produce a single work book. The group, making the best workbook recieved a prize. Peterson, *et al.* (1980) also used a simple method in which students worked in four member groups. Group members completed their own work sheets with help from their group mates. No group rewards were given.

2.1.2. CLASSROOM ENVIRONMENT

Piaget (1973), the world famous developmental psychologist, hypothesized that children must have opportunities to ***interact with their environment*** in order to develop. Such interaction enables them to construct knowledge. Bronfenbrenner (1989) has viewed the environment as a nested system of ***interrelationships***. Development is the result of the interrelationships of the individual with the community, the society and the world. Almost all of the educationists and psychologists have argued for providing ***proper*** Classroom Environment to the students for better ***academic*** development. Classroom as a ***learning community,*** plays an important role in the process of learning.

2.1.2.1. Definition and Concept of Classroom Environment

The term Classroom Environment and Classroom Climate have been used synonymously as the idea contained in both are almost the same. Good (1973) defined Educational Environment ***as the sum total of physical, social, economical and mental factors that contribute to the total teaching learning***

situations. Hawes and Hawes (1982) define Classroom Environment as the ***totality of external surroundings including conditions, circumstances and events in education often considered for the extent to which such surroundings facilitate learning.***

It can be concluded from these definitions that Classroom Environment is visualized as a ***combination of physical facilities, psychological characteristics and Instructional activities of a classroom set up by teacher and students to contribute to a wholesome learning situation.***

2.1.2.2. Classroom Environment and Learning Process

It is difficult to change the nature of a family, neighbourhood or city. It is less difficult to change the nature of the school experience. So a school community may be created to enhance the ***positive development*** of children and youth (Johnson & Johnson, 1998), ie a proper school environment particularly Classroom Environment should be provided for the good functioning of a learning system. The Classroom Environment depends not only upon the physical factors of the classroom, but on the social, emotional, educational and economical factors also. It also depends upon how the students and teachers ***perceive*** the classroom situation for bringing about maximum interpersonal relationships and thereby creating an atmosphere for effective and efficient learning.

Although the environment is important, it really has little to do with the traditional ideology or belief system (Bacharach, *et al.,* 1995). So teachers have to change the ideology of the classroom from autocratic to democratic. Comor-Jacobs (1993) also requests the teachers to move from a teacher-centered to a learner-centered environment. An autocratic classroom is a

teacher-dominated one, in which the teacher decides on the attempt and imposes the goals of learning activities. Whereas in a democratic classroom there is a large degree of ***permissiveness*** in the teacher-pupil and pupil-pupil relationships. Pupils are allowed to select the work project and they participate in deciding the teaching activities. They are not closely supervised, but are allowed to work ***independently***.

For maximum learning to take place, both structured curriculum and structured environment are needed (Marozas & May, 1988). To structure a favourable Classroom Environment, is a challenge for all teachers and it should be treated in the same manner. Teachers' ***method of handling*** the class is one of the main aspects of Classroom Environment. Evers (1999) pointed out that knowledgable teachers model and use guided practices to engage student interest, flexible grouping and balanced strategies and create a non-threatening, learning environment. Lacey (1991) pointed out that the ideal classroom in the regular school is designed to encourage student ***independence in learning*** with students able to retrieve their own resources from open shelves or cupboards and return when they have finished.

As Patrick (1995) observes ***a democratic teacher must challenge students to take responsibility for achieving educational objectives, foster academic freedom by encouraging and protecting free and open expression of ideas, establish and apply rules fairly, and create a respectful atmosphere.*** Such a learning environment contributes not only for better Achievement but also for fostering democratic values and social skills that would help the student for their future life (Aulay, 1990; Pierce, 1994; Lowenthal & Lowenthal, 1995 and Hudley, 1998).

It has been seen that proper Classroom Environment is very helpful for ***fostering achievement motivation***. Klein, *et al.* (1998) observed that the presentation of inappropriate levels of task difficulty and a non-stimulating Classroom Environment has fostered ***low motivation***. Learning is defined as the favourable change in behaviour. For this, a favourable atmosphere should be provided. Alteration of Classroom Environment is represented as the principal strategy for promoting ***student behaviour*** (Williams, 1999).

Meece and Mc Colskey (1997) argue that, by providing favourable Classroom Environment, teachers can make the students interested and engaged in the classrom activities. In short, a proper Classroom Environment, as Mc Dermott (1995) has pointed out, meets the psychological needs of the students, empowers them to make choices about learning, eliminates fear of failure, allows students to establish their own standards of achievement and motivates them to participate in the learning process.

2.1.2.3. Dimensions of Classroom Environment

On the basis of several findings of the studies of Martin (1994), Harris (1995), Hodges and Wolf (1997) and Hudley (1998), it can be seen that there are several dimensions for Classroom Environment. These are ***Teacher-student interaction, Student-student interaction, Assessment reporting and cooperation with parents, Organization of the classroom, Classroom entertainments and Physical conditions***. These different dimensions are briefly described in this section.

a. Teacher - Student Interaction

For developing a better Classroom Environment, a favourable and democratic relationship between the teacher and the student is essential.

Patrick (1995) has pointed out that effective democratic teachers must foster academic freedom by encouraging and protecting ***free and open expression of ideas, establish and apply rules fairly and create a respectful atmosphere.*** The teacher has to be seen as a family member of the students, so that students can freely interact with the teacher. ***Lack of participation*** and ***involvement*** of the teachers in the development and refinement of the teaching and learning materials, has led to a mechanical and purely matter-of-fact relationship between teachers and students (Anandakrishnan, 1998), ie teachers' interaction with the students depends upon their ***sincerity with the learning process.*** The amount of material (input) that a teacher presented to a pupil is directly related to the degree of ***warmth*** and ***friendliness*** that is established in the relationship between the teacher and the pupil. It also influences the degree to which the teacher will attempt to ***elicit*** responses from the pupils through questioning (out put) and the degree to which the teacher would supply the pupil with positive ***feed back*** through praise, acceptance of pupils' ideas and so on (Harris & Rosenthal, 1986). So the responsibility of a democratic teacher is to interact meaningfully with ***all*** of the students and help them to ***build a rapport*** with the teacher and the classmates and thus create a favourable environment that ***promotes*** learning. Teachers should care about justice in their classroom (Clarken, 1995), ie support, encouragement, protection for free opinion etc. should be given not only for high achieving pupils but for low achieving pupils also, and not considering the gender difference. It has been found that, favourable and smooth relationship with the teachers helped the students to build their own ***self esteem,*** which is highly affective to the total Classroom Environment. (Johnson, 1993 and Smith, 1997). It has also been found that a good teacher-student interaction contributed much to the ***social and Academic***

Achievement of the students (Rogers, 1990; Mason, 1994; Fink & Carrasquillo, 1994 and Hudley, 1998).

b. Student - Student Interaction

Learning is not possible without ***mutual interaction between the students.*** Johnson and Johnson (1998) identified that the school cannot be a ***learning community*** if students are ***isolated*** with no friends in the classroom. Friendship and belongingness among the students should be promoted in the classrooms, so that they can develop the basic ***social*** and ***academic skills***. A homely environment can be created in the classroom by promoting student-student interaction. Kohn (1992) suggests that success in the work place includes teamwork, getting along with others and shared decision making. So teachers should provide opportunities to the students to ***mingle with each other,*** giving up the idea of traditional authoritative classrooms. Working ***cooperatively*** with peers, resolving ***conflicts*** constructively and internalising ***prosocial values*** are experiences that all students need. Benard (1990) has identified the interaction among students as very essential for ***social development and satisfaction of basic human psychological needs.*** It provides a favourable social and psychological environment that ***enhances students' performance.*** Through interaction students' self-esteem is ***increased*** (Hodges & Wolf, 1997). All of the Cooperative Learning Strategies are based on the idea of ***peer- interaction.*** It has been found that almost all of the Cooperative Learning Strategies are successful in promoting ***social, psychological and academic development*** (Benard, 1990; Felder, 1995; Gillies & Ashman, 1996 and Leung & Chung, 1997).

c. Assessment Reporting and Cooperation with Parents

An able teacher assesses the development of the students and reports it

to students' parents continuously and seeks help for feed back. But how does it help to create a conducive Classroom Environment? The connection of the teacher with the parents of the students can influence the teacher-pupil interaction in a psychological perspective. By reporting assessment progression, by demanding responsibilities and by making use of them for feed back, a teacher can establish a continuous relationship with the parents. This would help the teachers to know the family background of each and every student which enables the teachers to remould the existing expectations of the students. Thus, teacher-pupil ***relationship gets strengthened,*** which contributes much for Classroom Environment. In a psychological view, teacher-parent relationship enables the students to perceive the teacher as a ***family friend.*** This perception makes a favourable ***change*** in the student-teacher relationship. A number of educationists have demanded ***parent - involvement*** in the educational process (Ysseldyke & Christenson, 1993; Martin, 1994; Fourts, 1995 and Reyes, *et al.,* 1999).

d. Classroom Organization

Although teacher-pupil and pupil-pupil interactions are very much effective on Classroom Environment, it is not possible in a ***traditionally organized classroom.*** A well organized classroom provides neat, orderly surroundings; a classroom library with book shelves and comfortable seating; a well-supplied writing centre and a colourful and attractive decor (Love, 1995). For the functioning of the two types of interactions (teacher-student and student-student) there should be enough and comfortable space in the classroom for learner movement and learner interaction. ***Seating arrangement*** is very important in a classroom (Wheldall, *et al.,* 1981) and it can create a friendly, genuine learning environment. The seating arrangement needs to be organised so that everyone in the class can see everyone.

Harris (1995) has pointed out that a mood conducive to learning can be created by organising charts and posters (for eg: peace posters) in the classroom. In short, classroom organization can be considered as a strong component of Classroom Environment.

e. Classroom Entertainments

Opportunities for entertainments make the students interested in the classroom. For this, plenty of extra curricular activities can be planned and implemented in the classroom. Bohrer (1995) considers extra curricular activites as one among the basic areas through which teachers can influence to help students' experience success. Games, puzzles, stories, songs, art work experience etc., can be used as extra curricular activities which provide opportunities for entertainment and engagement. Reyes, *et al.* (1999) are of the opinion that the learning activity itself should provide the students with ***opportunity for entertainment.*** Most of the teachers have a ***negative or neutral attitude*** towards entertainment programmes. But research evidence shows that they have an important role in producing a ***proper Classroom Environment.***

f. Physical Conditions of the Classroom

Physical facilities influence students' ***perception of the classroom.*** Convenient seating and writing equipment, book shelves, blackboard, enough classroom space, drinking water facility, waste box, charts, maps and other gadgets etc. are all included in the physical facilities. These basic facilities are essential for the well-functioning of a classroom. An effective learning environment would provide ***these essential physical facilities*** to the students. Classroom size is another factor that determines the total learning

environment. A large classroom with large number of students and without sufficient classroom space may negatively affect the learning environment. Hunn-Sannito, *et al.* (2001) favour smaller class size with enough space. Love (1995) and Harris (1995) found that the use of learning aids such as posters, charts etc., can help the teacher create a ***mood or environment*** conducive to learning. Non attractive and poor physical condition would destroy ***students' interest and mood to learn.***

2.1.2.4. Measurement of Classroom Environment

Classroom Environment can be studied from many angles including the consideration of ***pupil or teacher affective factors*** like satisfaction, involvement, affiliation, competition, innovation, apathy, democracy etc. A number of instruments for assessing Classroom Environment/ Classroom Climate have been developed by various environment researchers and some of them are briefly described in the following section.

a. Classroom Environment Scale (CES)

The CES is a set of nine separate but somewhat similar instruments. It was developed by Moos and Trickett (1974). The final version of the CES contains ***nine scales*** with 10 items of True - False response format in each scale. Typical items in the CES are ***Task orientation, Teacher control*** and ***Innovation.*** The CES has been designed to measure both ***actual*** environment and ***preferred*** environment. The scoring direction is reversed for half of the items in each CES scale.

b. Learning Environment Inventory (LEI)

It is an instrument developed by Fraser, *et al.* (1982). So far the LEI has been used only to measure actual environment, although there appears to be

no reason why LEI items could not be used equally well as a basis for assessing preferred environment. The final version of the LEI contains a total of 105 statements descriptive of typical school classes. The respondent expresses the degree of agreement with each statement on á four-point scale with response alternatives of ***Strongly disagree, Disagree, Agree*** and ***Strongly agree.*** Typical items contained in the LEI are ***Cohesiveness, Friction, Speed and Disorganisation.*** The scoring direction is reversed for negative items.

c. My Class Inventory (MCI)

Fraser, *et al.* (1982) developed MCI specifically for primary school children. But it has been found to be very useful with ***junior high school students.*** It is a different form of LEI. Two point (Yes-No) response format is used for MCI. The recent version of MCI contains 38 items. Typical items are ***Friction, Difficulty*** and ***Satisfaction.***

d. College and University Classroom Environment Inventory (CUCEI)

This instrument, developed by Fraser, *et al.* (1984) is intended for use in small groups (up to 30 students). The final form of the CUCEI contains 49 items. Each item is responded using the four categories of ***Strongly agree, Agree, Disagree*** and ***Strongly disagree.*** The scoring direction is reversed for approximately half of the items in each scale. Typical items are ***Task orientation*** and ***Individualization.***

e. Individualized Classroom Environment Questionnaire (ICEQ)

ICEQ was developed by Fraser (1985). The final version of this instrument contains 50 items. Each item is responded on a five point scale with the alternatives of ***Almost never, Seldom, Sometimes, Often*** and ***Very often.*** The scoring direction is reversed for many of the items. Typical items

are ***Participation, Independence and Differentiation.*** It has four separate forms which assess respectively student perception of ***actual*** environment, student perception of ***preferred*** environment, teacher perception of ***actual*** environment and teacher perception of ***preferred*** environment.

f. Scale of Classroom Climate (SCC)

This scale was constructed by Pillai and Santhakumari (1992). It was designed to collect data from secondary school students on various ***elements of classroom climate*** that affect the learning process.

g. Classroom Environment Inventory (CEI)

Another instrument, CEI has been prepared by Pillai and Sunitha (1996) based on ***My Class Inventory*** developed by Fraser, *et al.* (1982). This is a refined instrument to collect data about ***primary school pupils' perception about their classroom environment.***

h. Scale of Classroom Climate (SCC)

Another SCC was developed by Usha and Sunitha (1997). It was framed to elicit secondary school pupils' perceptions on different elements of classroom climate. It includes 58 ***items*** related to various aspects of classroom climate.

2.2. REVIEW OF RELATED STUDIES

In this section, it is aimed at presenting the review of research findings and summarising literature which relates ***Cooperative Learning and Achievement*** and ***Classroom Environment and Achievement.*** The related studies are categorised into two and presented under the following headings.

2.2.1. STUDIES ON COOPERATIVE LEARNING AND ACHIEVEMENT

The survey of related literature during the period 1963-2002, exposed a number of studies on Cooperative Learning and its inconclusive effect on Academic Achievement. The relevant aspects of the studies relating to Cooperative Learning and Academic Achievement are classified as in the following.

2.2.1.1. Studies Showing Achievement Benefits

Studies showing Achievement benefits with Cooperative Learning are presented in this sub-section.

In the study of ***Sharan (1980),*** it has been consistently demonstrated that Cooperative Learning ***facilitates Academic Achievement.***

Johnson, et al. (1981) found a generally ***positive effect*** of Cooperative Learning approaches on studentsAchievement as illustrated by the findings of a very comprehensive meta-analysis involving 122 studies.

Slavin's (1983a,b) review of studies of Cognitive Achievement, supports the efficacy of Cooperative Learning in that 63 percent of these studies ***favoured Cooperative methods,*** while only in one study, the result favoured the control group.

Fraser and ***Walberg (1984)*** give evidence from their studies that Cooperative Learning was ***more successful*** than either competitive or individualistic learning.

McDonald, et al. (1987) found in their studies that Cooperative Learning was ***more effective*** than individual learning.

Slavin's (1987) research on Cooperative Learning has revealed that the individual can ***grow cognitively*** through Cooperative efforts. Multiage students spend a great deal of time working in Cooperative groups and have considerable opportunity to learn from each other.

Angry (1990) reports a study in which samples were provided with 12 weeks of lessons, activities and projects that were designed to increase their knowledge and increase and build positive communication skills, thereby enhancing ethnic relations among them. ***The outcomes of the study were very positive.***

Brickle (1990) used a variety of learning preferences such as Cooperative Learning, Socratic questioning and Computer-assisted instruction so as to improve interest and success in mathematics. The result showed that students' ***performance was improved and the class attendance was increased.***

Dunne and ***Bennett (1990)*** found that students of all abilities ***improved*** the skills of ***discussion, suggesting, concluding, testing, inferring and reflecting*** when working in mixed-ability groups and that they improved in terms of both Cooperation and independence.

Jackson (1990) put forth the following implications in the light of his study: ***(i) one-to-one tutoring, small groups, peer tutoring and Cooperative Learning are very successful (2) personal contact with the teacher and the subject is important. (3) students' confidence must be encouraged with explanations, demonstrations, assistance and assurance.***

Lowman (1990) divided his students into two groups, asking one group to prepare and teach a body of material to the class, and the other to master

the information for test performance alone. When tested, the former group demonstrated ***much greater mastery of the material than did the students who had learned the material by more traditional techniques.***

A study by ***Seaman (1990)*** investigated the effect of the study skill strategies of concept mapping and Cooperative Learning on students' Academic Achievement. Forty, fifth grade students were placed in three groups: (1) Cooperative concept mapping group (2) a standard concept mapping group and (3) a control group. The students studied a science text and were later tested on their learning. Students in ***both concept mapping groups received higher scores on weekly vocabulary tests and the final unit test than did students in the control group.***

In the light of ***Slavin's (1990)*** research work, it was revealed that cognitive development and the use of critical thinking strategies were promoted through ***peer interaction and Cooperation.***

The result of the study of ***Wills (1990)*** revealed that the target group (in which Cooperative Learning was experimented) evidenced signficantly ***higher level of Achievement than the control group in vocabulary skills.***

In a study conducted by ***Fiedler-Brand, et al. (1992)***, it was found that providing ***heterogeneously grouped Cooperative Learning experience is most effective*** for serving all students, including the gifted.

In the light of a project conducted among 24 grade 11 basic U.S. history students in a growing, middle class, suburban community in northern Illinois, ***Ellett (1994)*** recommends ***Cooperative Learning as a solution strategy to improve Academic Achievement.***

Cooperative Learning techniques used by ***Keeler (1994)*** proved that ***they were effective in improving student performance in a freshman level statistics course.***

In the light of their study, ***Kumar*** and ***Rai (1994),*** suggest ***Cooperative Learning as a better strategy for Achieving more.***

Shacher and ***Sharan (1994)*** found in their study that ***Cooperative Learning was more effective than whole class instruction.***

Cooperative home work, cooperative quizzes, electronic-mail communication and open office hours were used by ***Dougherty (1995)*** with a view to improve student performance, retention and attitudes in general chemistry. As the result ***student Achievement was improved.***

As part of an ongoing longitudinal study ***Felder (1995)*** taught five chemical engineering courses in consecutive semesters to a cohort of students, using Cooperative Learning and other instructional methods designed to address a broad spectrum of learning styles. The results suggest that ***active and Cooperative Learning methods facilitate both learning and a variety of interpersonal and thinking skills.***

A Cooperative Learning Strategy was experimented by ***Keeler*** and ***Anson (1995)*** in a college computer skills lab course. The results indicated that this ***Cooperative Learning Strategy improved students' Academic Achievement when compared to traditional individual learning.***

Lurie and ***Ovrebo (1995)*** describe the content and instructional techniques used in a college course on program evaluation. They discuss the use of Cooperative Learning Methods and field work as Instructional

Strategies and maintain that ***students evaluations indicate the course Achieved its objectives.***

Stevens and ***Slavin (1995)*** made a study inorder to find out the effectiveness of a Cooperative Learning Approach on academically handicapped and non-handicapped students. The reading and writing skills of the students (of both category) were ***found to increase.***

A Newzealand study by ***Townsend*** and ***Hicks (1995)*** examined the relationship between Form Two students' (n=162) academic task values in two school subjects, mathematics and language, and their perceptions of social satisfaction in classroom using a Cooperative goals structure. It was found that ***task values for engagement in mathematics and language activities were higher, and perceived costs lower, in classrooms using a Cooperative goal structure.***

Brush (1996) conducted a study on integrated learning system and found Cooperative Learning a ***better strategy for effective learning.***

A sample consisting of 192 sixth graders participated in a study conducted by ***Gillies*** and ***Ashman (1996)*** that compared the effects on behaviour and achievement of Cooperative Learning with group members trained to facilitate each other's learning and Cooperative Learning in which members did not receive such training. Training resulted in ***positive effects on Achievement and behaviour.***

A three - year project conducted by ***Hill (1996)*** proved that students taught through Cooperative Learning, demonstrated significant ***gains in Achievement and critical thinking skills, teamwork skills and sense of communication.***

Xin (1996) conducted a research project to find out the effects of computer-assisted Cooperative Learning in mathematics instruction within integrated classrooms for 118 third - graders (25 with learning disabilities) and 92 fourth - graders (16 with learning disabilities). Results showed that the ***Cooperative Learning group's scores on maths Achievement were statistically higher than those of the whole-class learning group.***

In an action research project, conducted by ***Brauer, et al. (1997),*** Cooperative Learning Strategies were used to enhance student ***engagement, active listening, turn-taking, appropriate behaviour and voice volume, and use of 'happy' talk. Findings indicated an increase in student critical thinking skills, an improvement in interpersonal skills, and an increase in the use of conflict resolution skills.***

Hameed (1997) conducted an experimental study on a sample of 80 students of standard VII from two upper primary schools in Kerala state. The investigator found ***Cooperative Learning was a better strategy than Conventional Method of Teaching for social science.***

Hodges and ***Wolf (1997)*** conducted an action research project for increasing student self-esteem through a caring and positive classroom environment incorporating Cooperative Learning and the use of praise and rewards. Post intervention data indicated an ***increase in positive self-esteem greater student engagement and increased Achievement levels.***

Leung and ***Chung (1997)*** investigated the effect of Cooperative Learning on student Achievement in an educational technology course in an initial Teacher Training Programme. The Cooperative Learning Strategy was compared with the traditional whole-class direct-instruction approach.

Results indicated that the ***Cooperative Learning Strategy had a positive effect.***

In an experimental study, done with a sample of 110 students from two upper primary schools in Palakkad district, ***Sasidharan (1997)*** found that ***pupils taught through Cooperative Learning Strategy acquired higher Achievement*** in Malayalam Language than pupils taught through Conventional Method of Teaching.

Geiss and ***Mayer (1998)*** report a research programme that was intended for improving listening skills, lack of which interferes with second language acquisition. The targeted population was first and second year Spanish students in one middle school and one high school. Cooperative group discussions, as a teacher strategy were implemented. The results indicated ***improved student listening skills and understanding of content.***

A program, reported by ***Klein, et al. (1998),*** was implemented to increase class Achievement by raising the motivational level of adolescents. The targeted population consisted of high school mathematics students from a metropolitan area located in central Illinois. The post intervention data indicated that ***Cooperative Learning and multiple intelligence activities enhanced students' motivation for learning mathematics and thereby Achievement.***

Bindhu (1999) conducted a study in order to find out the interaction effect of Cooperative Learning, peer teaching and cognitive entry behaviour of standard VI pupils on Achievement in Malayalam Language skills. ***In the results, a positive relationship was found between Cooperative Learning Strategy and Achievement in Malayalam Language skills.***

Golda (1999) conducted a study to find out the effectiveness of Cooperative Learning Strategy over Traditional Method of Teaching English Language in standard VIII pupils. It was found in the result that ***Cooperative Learning Strategy was more effective than traditional method of learning.***

A year-long school-based study, conducted by ***Lee, et al. (1999)*** in Singapore investigated the effects of the use of Cooperative Learning in elementary social studies classrooms on social studies Achievement. Results indicated that ***lower ability pupils benefited the most from the use of Cooperative Learning on social studies lessons.*** These students had better social studies test scores than the control class and did just as well as the high ability pupils on the recall items of the test.

An action research project conducted by ***DeKeyrel, et al. (2000)*** sought to improve student motivation inorder to increase academic performance among eighth graders in an urban community. A variety of Cooperative Learning and social skill activities were incorporated in the intervention. The post intervention data indicated ***an overall improvement in many areas including Academic Achievement.***

A research work by ***Holliday (2000)*** aimed at contributing to the literature on Cooperative Learning, especially Jigsaw-II at the secondary level. The research also represents a continuation of research conducted on Jigsaw-II and III, subsequently leading to the development of Jigsaw-IV as a Cooperative Learning Strategy. Subjects in all the three researches were 100 ninth-grade geography students. The findings suggested that ***Jigsaw-IV answered the concerns of students and teachers using Jigsaw-II and had a positive impact on students' Academic Achievement.***

An action research project conducted by ***Janes, et al. (2000)*** examined the impact of a multifaceted intervention on student motivation and Achievement. The sample was second and third graders from three schools. The 12-week intervention was comprised of three elements including Cooperative Learning. The participating teachers concluded that ***Cooperative Learning and engaged learning were used together to successfully increase student motivation and Achievement.***

Mahenthiran and ***Rouse (2000)*** studied whether the performance and attitudes of students could be improved by giving them some control over the group selection process in Cooperative Learning. The results with 110 college students showed that ***students' attitudes toward the Cooperative Learning Experience were better and their grades were higher.***

✓ ***Bartscher, et al. (2001)*** conducted a study which describes a program for students in the target, fourth, seventh and eighth grades who exhibit low Achievement in writing. The solution strategy involved Cooperative Learning, journalizing and creative writing. The results ***showed an improvement in writing.***

Inorder to increase motivation in fifth-grade social studies students, ***Carroll*** and ***Leander (2001)*** conducted an action research project. Two categories of intervention including Cooperative Learning were implemented. The post-intervention data indicated ***an improvement in student motivation, attitudes and academic performance.***

A project was created by ***Copeland, et al. (2001)*** for seventh and eighth grade students to improve their academic success. Interventions consisted of instruction in Cooperative Learning activities and the results suggested that

classroom strategies and combined efforts of teachers helped to improve both students' motivation and Academic Achievement.

Fuller (2001) examined the effectiveness of the Partners Advancing the Learning of Maths and Science (PALMS) educational model for teachers. The PALMS model was based on Cooperative Learning and used student research, primary resources, critical thinking, ongoing assessment, student presentations and comprehensive, standards-based state testing. The data from this study indicated that ***active training events significantly influenced the willingness of teachers to use PALMS, and students enjoyed substantial educational benefits of the model.***

Ghaith (2001) investigated the perceptions of the Cooperative Learning experience of a group of Lebanese middle school learners who studied the rules and mechanics of English as a foreign language, according to the dynamic of the Student-Teams-Achievement Divisions (STAD) Cooperative Strategy. The results indicated that ***learners were generally positive about their experience.***

Goldberg, et al. (2001) used Cooperative Learning Strategies to increase high school and middle school students' motivation for doing well in school. The targeted population consisted of middle school students in physical education and science classes, and high school students in science, technology and special education classes. The results indicated that ***Cooperative Learning improved student motivation and Academic Achievement.***

The use of Cooperative Learning in a middle school computer laboratory was studied by ***Holliday (2001).*** In this study, four heterogeneous groups were formed from 52 students, with male and female partners in each

group. ***There was found a significant positive relationship between Cooperative Learning and Students' Academic Achievement.***

Kumar and ***Hameed (2001)*** report a study in which 40 standard VII pupils were taught through Learning Together Model of Cooperative Strategy. The post test scores were compared with that of another 40 pupils who were taught through Conventional Method of Teaching. ***Higher Achievement was observed with pupils taught through Cooperative Learning Strategy.***

Krank and ***Moon (2001)*** applied Instructional Strategies derived from the concept of mastery learning and Cooperative Learning to 104 undergraduate social science students enrolled in three sections of a required course and found ***significant effects for the combined mastery/Cooperative Learning condition when compared to mastery learning alone.***

Kumar and ***Bindhu (2002)*** report an experiment in which a sample of 100 standard VI pupils were utilised to study the relative effectiveness of Cooperative Learning Strategy and Conventional Method of Teaching on Achievement in Malayalam Language skills. ***Cooperative Learning Strategy was found more effective than the control treatment.***

On the basis of a review of several past studies, ***Kumar*** and ***Bindhu (2002)****suggest that ***Cooperative Learning Strategies are more effective than the Conventional Teaching Methods with regard to Academic Achievement and social and psychological development.***

2.2.1.2. Studies Showing No Achievement Benefits

Some of the studies relating to Cooperative Learning and Achievement ***do not show any Achievement benefits.*** They are presented in this part of the review.

Miller and ***Hamblin (1963)*** conducted experimental studies on learning strategies and found ***no Achievement benefits for Cooperation when compared with individualistic and competitive learning strategies.***

A series of studies conducted by ***Haines*** and ***Mc Keachie (1967)*** have found that while daily performance is superior under a Cooperative goal structure there are ***no significant differences on examination performance among individuals who studied in a competitive or Cooperative group.***

The studies of ***Julian*** and ***Perry (1967)*** and ***Clifford, (1971)*** indicate that ***competition may be superior to Cooperative or individualistic goal structures*** when the task is a simple drill activity or when sheer quantity of work is desired on mechanical or skill-oriented task that requires little if any help from another person.

Several lengthier studies of 'pure' Cooperation that lasted for two to ten weeks, conducted by ***Wheeler*** and ***Ryan (1973)*** on elementary school students, found ***no Achievement benefits for Cooperation compared with individualistic or traditionally taught control classes.***

One of the studies of cognitive Achievement conducted by ***Slavin (1983a) favoured the control group rather than Cooperative Learning group.***

A study by ***Hythecker, et al. (1984)*** indicated that students who were taught a Learning Strategy (net working) by interacting with both a micro computer and a Cooperating partner performed ***significantly worse than students who received the same training individually.***

Despite most of other research works indicating the superiority of Cooperative Learning over competitive methods, ***Okebukola (1984)*** found in a Nigerian study that ***students did equally as well under Cooperative and***

competitive conditions so long as students were placed in a learning setting which matched their preferences.

Slavin (1985) summarised some studies and found ***Learning Together Model (One among Cooperative Learning Strategies) as equal to the control group in Achievement effects and lower than the control group in another.***

In two studies of ***Malouf (1990),*** 36 junior high students and 66 intermediate-level students with mild disabilities worked together to complete computerised instructional activities on capitalization and punctuation. The intervention produced significant increase in behaviour that was positively related to learning ***but did not produce significant increase in learning.***

Achievement difference between sixth grade boys and girls in individualistic and Cooperative Learning situations was studied by ***Petersen (1991).*** Found ***no difference in Achievement between individualistic and Cooperative Learning situations.***

The effectiveness of small-group Cooperative Learning and a more teacher-centered instructional style on student performance in mathematics was studied by ***Urion*** and ***Davidson (1992).*** The sample was junior high school and college students. ***No significant difference in performance was found between the small group-class and the teacher-centered class.***

A study conducted by ***Pisani (1994)*** examined the effects of Coopeative Learnig Environment on Academic Achievement and persistence by examining the precursory measure of student involvement. A sample of 68 freshmen from the 1992 entering class at the University of Illinois were used. The findings suggests that the positive influence of ***Cooperative Learning Environment is carried into student involvement and not into other areas.***

Fourts (1995) reports a study which was conducted in two schools, one focusing on the area of Health Science Studies (HSS) the second focusing on the International Business and Global Studies (IBGS). Both schools feature an integrated curriculum, Cooperative Learning, the direct application of learning to life situations, flexible scheduling, cohort learning and alternative assessment strategies. The result indicated that ***First Year participation in both schools did not translate into higher grades.***

Four instruction conditions were compared by ***Laney (1996)*** with 121 first and second graders. The four different conditions were Cooperative Learning, mastery learning, cooperative-mastery learning and a control treatment. A Post-test revealed that ***Cooperative-mastery method was more effective in promoting student learning than the Cooperative Learning alone and other methods.***

In a study reported by ***Abu*** and ***Flowers (1997)***, high school home economic students were taught by a nutrition unit (91 using Cooperative Learning and 106 controls). The results showed ***no difference in Achievement or attitudes.***

Preferences for competitive and Cooperative Learning were explored by ***Feldhusen, et al. (2000)*** in 176 gifted students (ages 9-17). They found ***competition as an energizing factor for better learning.***

In a study conducted by ***Krank*** and ***Moon (2001)***, 104 under graduate social science students enrolled in three learning conditions such as mastery learning condition, Cooperative Learning condition and combined mastery/ cooperative learning condition. In the results, ***combined mastery/cooperative learning condition was found more effective than mastery learning alone or Cooperative Learning alone.***

2.2.1.3. Summary of Studies on Cooperative Learning and Achievement

Studies reviewed on Cooperative Learning and Achievement during the period from 1963 to 2002 are summarised as follows to get a whole picture in a nutshell.

Year	Author	Result
1980	Sharan	Facilitates Academic Achievement
1981	Johnson, *et al.*	Positive effect on Achievement
1983	Slavin	Favoured Cooperative methods
1984	Fraser and Walberg	More successful than competition and individualization
1987	McDonald, *et al.*	Cooperative Learning was more effective than individual learning
1987	Slavin	Individuals can grow cognitively through Cooperative efforts
1990	Angry	The outcomes of the study were very positive
1990	Brickle	Students' performance was improved
1990	Dunne and Bennett	Positive relationship between the variables
1990	Jackson	Significant positive effect
1990	Lowman	Much greater mastery of the material than the traditional techniques
1990	Seaman	The variables were positively correlated
1990	Slavin	Critical thinking strategies were promoted through peer interaction and cooperation
1990	Wills	Significantly higher level of Achievement than the control group

1992	Fiedler-Brand, *et al.*	Heterogeneously grouped Cooperative Learning experience was most effective
1994	Ellett	Cooperative Learning is a solution strategy to improve Academic Achievement
1994	Keeler	Effective in improving student performance
1994	Kumar and Rai	Cooperative Learning is a better strategy for achieving more
1994	Shacher and Sharan	Cooperative Learning was more effective than the whole class instruction
1995	Dougherty	Student Achievement was improved
1995	Felder	Cooperative Learning methods facilitate both learning and interpersonal skills
1995	Keeler and Anson	Cooperative Learning Strategy improved students' Academic Achievement
1995	Lurie and Ovrebo	Significant positive effect
1995	Stevens and Slavin	Reading and writing skills of the students were found to increase
1995	Townsend and Hicks	Achievement benefits for Cooperation
1996	Brush	Cooperative Learning is a better strategy for effective learning
1996	Gillies and Ashman	Positive effects on Achievement and behaviour
1996	Hill	Gains in Achievement
1996	Xin	Achievement was statistically higher
1997	Brauer, *et al.*	The variables were positively correlated

1997	Hameed	Cooperative Learning was a better strategy than Conventional Method of Teaching
1997	Hodges and Wolf	Greater student engagement and increased Achievement
1997	Leung and Chung	Cooperative Learning Strategy had a positive effect
1997	Sasidharan	Pupils taught through Cooperative Learning Strategy acquired higher Achievement than the control group
1998	Geiss and Mayer	Improved student listening skills and understanding of content
1998	Klein, *et al.*	Enhanced students' motivation and thereby Achievement
1999	Bindhu	Positive relationship between the variables
1999	Golda	Cooperative Learning Strategy was more effective than the Traditional method
1999	Lee, *et al.*	Lower ability pupils benefitted the most from the use of Cooperative Learning
2000	DeKeyrel, *et al.*	An overall improvement in many areas including Achievement
2000	Holliday	Had a positive impact on students' Achievement
2000	Janes, *et al.*	Successfully increased student Achievement
2000	Mahenthiran and Rouse	Student's grades were higher
2001	Bartscher, *et al.*	The sample showed an improvement in writing
2001	Carroll and Leander	An improvement in student motivation, attitudes and academic performance
2001	Copeland, *et al.*	Improved both students' motivation and Academic Achievement

2001	Fuller	The variables were positively correlated
2001	Ghaith	Learners were generally positive about their experience
2001	Goldberg, *et al.*	Cooperative Learning improved student Achievement
2001	Holliday	Significant positive relationship between the variables
2001	Kumar and Hameed	Higher Achievement was observed with pupils taught through Cooperative Learning Strategy
2001	Krank and Moon	Significant positive effect on Achievement
2002	Kumar and Bindhu	Cooperative Learning Strategy was found more effective than the control treatment
2002	Kumar and Bindhu	Cooperative Learning Strategies are more effective than the Conventional Teaching Methods
1963	Miller and Hamblin	No Achievement benefits for Cooperation
1967	Haines and Mc Keachie	No significant difference in Achievement when compared to the control group
1967, 1971	Julian and Perry; Clifford	Competition may be superior to Cooperative goal structure
1973	Wheeler and Ryan (1973)	No Achievement benefits for Cooperation when compared to the control treatment
1983	Slavin	Favoured the control group rather than Cooperative Learning group.
1984	Hythecker, *et al.*	Performance was significantly worse
1984	Okebukola	No Achievement benefits
1985	Slavin	Student performance was equal to that of the control group

1990	Malouf	Did not produce significant increase in learning
1991	Petersen	No difference in Achievement between the individualistic and Cooperative Learning situations.
1992	Urion and Davidson	No significant difference in performance when compared to the control treatment
1994	Pisani	Cooperative Learning Environment was carried into student involvement and not into other areas
1995	Fourts	Did not translate into higher grades
1996	Laney	No Achievement benefits
1997	Abu and Flowers	No difference in Achievement
2000	Feldhusen, *et al.*	Competition was an energizing factor for better learning
2001	Krank and Moon	Combined mastery/cooperative learning condition was found more effective than Cooperative Learning alone

2.2.2. STUDIES ON COOPERATIVE LEARNING AND RETENTION

Research findings that relate Cooperative Learning and Retention (from the year 1990 to 2002) are presented in this section.

2.2.2.1. Studies Showing Retention Benefits

The reviewed research findings, showing positive relationship between Cooperative Learning and Retention are presented as follows.

Two experiments by ***O'Donnell (1990)*** examined Cooperative Learning, effects of learning about equipment in advance, and Retention of information over six weeks. The results from 114 undergraduates support ***positive effects of Cooperative Learning***.

Petersen (1991) conducted a study concerning achievement difference between sixth grade boys and girls in individualistic and Cooperative Learning situations. It was found that ***Cooperative Learning produced greater Retention.***

An action research experiment by ***Miller (1992),*** compared the individualistic and Cooperative Learning results in two seventh grade classrooms. It was found that ***Retention scores slightly favoured the Cooperative Learning method.***

Urion and ***Davidson (1992)*** report the results of five contrasts between small-group Cooperative Learning and a more teacher-centered instructional style employed in junior high school and college mathematics classes. The result indicates that ***the small-group class performed better in long-term Retention.***

Sudzina (1993) investigated whether audiotape construction would affect preservice teachers' mastery and Retention. Experimental students cooperatively created audiotape scripts for learning terms. Control students received lectures and text. Experimental students expressed confidence and competence in learning and ***retained more than the control students.***

A classroom research conducted by ***Billington (1994)*** examined the effects of collaborative test-taking on mathematics Retention of third grade students. The findings indicated that ***collaborative testing promoted Retention.***

In a freshman level statistics course, formal use of ***Cooperative Learning techniques was found effective in improving students' performance and Retention,*** as reported by ***Keeler (1994).***

Dougherty (1995) examined the effect of Cooperative Learning and enhanced communication on student performance, Retention and attitudes in general chemistry. The result indicated that ***cooperative home work and cooperative quizzes were associated with significantly higher student performance and Retention.***

Keeler and ***Anson (1995)*** report a study on Cooperative Learning Strategies used in a college computer skills lab course, in which they compared the learning performance and Retention of students taught via Cooperative teams and traditional individual learning. The results showed that ***both performance and Retention were significantly improved with the use of Cooperative Learning.***

Scheffer (1995) reports an adult education project SHELCOM in homeless shelters in Philadelphia and Pennsylvania, that investigated the effect of using computer on participant's writing and communication skills. The project consisted of two-hour workshops, twice weekly, complemented by online support and Cooperative Learning. By this ***Retention of the learners was found to increase.***

Hill (1996) conducted a three-year project, in which the sample was taught through Cooperative Learning Strategy. The results ***showed significant gain in Retention as well as Achievement.***

Laney (1996) examined economic concept learning and Retention in 121 first and second graders who were randomly assigned to four instructional conditions. It was found that ***Cooperative-mastery method was superior to other methods in promoting learning and Retention.***

Dougherty (1997) experimented the effectiveness of a teaching strategy designed to increase student Retention while maintaining academic

performance levels in undergraduate organic chemistry, that used grade/ study-performance contracts, enhanced communication using electronic mail and Cooperative Learning. The results indicated that ***a series of interventions could substantially increase Retention without degradation of standards for performance.***

A sample of 40 students was taught through Cooperative Learning Strategy for an experiment conducted by ***Hameed (1997).*** Another 40 students were taught through Conventional Method of Teaching. The power of Retention of the two groups was compared. It was found that, ***pupils taught through Cooperative Learning Strategy were superior to the other group in retaining the material taught.***

In the light of many surveys conducted in Europe, U.S.A. and Africa, ***Millen-Penn (1997)*** recommends the adoption of Cooperative Learning techniques in history courses and argues ***that Cooperative Learning facilitates critical thinking, democratic values and improved Retention.***

Petty (1997) conducted a study to find out the effectiveness of Cooperative groups and authentic assessment on student engagement and Retention. ***The result revealed that construction of Cooperative groups was very helpful to increase student engagement and Retention.***

The relative effectiveness of Cooperative Learning Strategy and Conventional Method of Teaching on Retention of standard VII Malayalam pupils was studied by ***Sasidharan (1997).*** The results indicated that ***pupils taught through Cooperative Learning Strategy showed higher Retention power than the other group.***

Bindhu (1999) studied the effectiveness of Cooperative Learning Strategy and Conventional Method of Teaching on Retention in Malayalam

Language skills of standard VI pupils. The results indicated that ***pupils taught through Cooperative Learning Strategy retained more than pupils taught through Conventional Method of Teaching.***

Retention power of standard VIII pupils in English Language was studied by ***Golda (1999)***. Cooperative Learning Strategy and Traditional Method of Teaching were included in the intervention. ***Cooperative Learning Strategy was found accountable for higher Retention.***

Joyce (1999) conducted an experiment in which students worked cooperatively on home work, problem solving and test preparation. ***When interdependence was rewarded, cooperative group study was found helpful for higher Retention.***

A sample of 100 standard VI pupils was selected for a study reported by ***Kumar*** and ***Bindhu (2002)***. Half of the total sample (50 pupils) was taught through Cooperative Learning Strategy and the other half (50 pupils) was utilized for the control treatment. The Retention power of both the groups was compared. ***The Experimental treatment was found more effective than the control treatment*** with regard to the Retention in Malayalam Language.

2.2.2.2. Studies Showing No Retention Benefits

In this part, studies showing no Retention benefits with Cooperative Learning are presented.

Billington (1994) conducted two studies to find out the effects of Cooperative test-taking on student mathematics Retention, in which one study yielded ***a negative relationship between the collaborative effort and Retention.***

One hundred and twenty one first and second graders were randomly assigned to one of four instruction conditions, for a study conducted by ***Laney (1996)***. The instruction conditions were, Cooperative Learning, mastery learning, cooperative mastery learning and a control treatment. It was found in the Post test that ***cooperative-mastery method was superior to other methods including Cooperative Learning alone in promoting student Retention***.

Abu and ***Flowers (1997)*** reported a study in which a nutrition unit taught the high school home economics students (91 using Cooperative Learning and 106 controls). A test conducted three weeks after the instruction showed ***no difference in Retention***.

2.2.2.3. Summary of Studies on Cooperative Learning and Retention

Reviewed studies on Cooperative Learning and Retention are summarised and presented as follows.

Year	Author	Result
1990	O'Donnell	Supports the positive effects of Cooperative Learning
1991	Petersen	Cooperative Learning produced greater Retention
1992	Miller	Retention scores slightly favoured the Cooperative Learning method
1992	Urion and Davidson	The small-group class performed better in long-term Retention
1993	Sudzina	Cooperative Learning group retained more than the control group
1994	Billington	Cooperative Learning promoted Retention
1994	Keeler	Effective in improving student Retention

1995	Dougherty	Produced higher Retention
1995	Keeler and Anson	Both performance and Retention were significantly improved
1995	Scheffer	Retention of the learners was found to increase
1996	Hill	Significant gain in Retention
1996	Laney	Cooperative-mastery method was superior to other methods in promoting Retention
1997	Dougherty	Retention was increased.
1997	Hameed	Positive relationship between the variables
1997	Millen-Penn	Cooperative Learning improved Retention
1997	Petty	Construction of Cooperative groups was very helpful to increase Retention
1997	Sasidharan	Variables were positively correlated
1999	Bindhu	Cooperative Learning group retained more than the control group
1999	Golda	Cooperative Learning Strategy was found accountable for higher Retention
1999	Joyce	Cooperative group study was found helpful for higher Retention
2002	Kumar and Bindhu	Cooperative Learning Strategy was found more effective than the control treatment with regard to Retention
1994	Billington	A negative relationship between the variables
1996	Laney	Cooperative-mastery method was superior to other methods including Cooperative Learning alone in promoting student Retention
1997	Abu and Flowers	No Retention benefits

2.2.3. STUDIES ON CLASSROOM ENVIRONMENT AND ACHIEVEMENT

In this part of the review, research findings that relate Classroom Environment and Achievement are presented (from the year 1978 to 2001). Studies having both positive and negative results were reviewed.

2.2.3.1. Studies Showing Positive Results

Studies showing positive relationship between Classroom Environment and Achievement are presented in the following part.

Kelly (1980) reports a study of association between student-perceived Classroom Environment and student Achievement. He chose 14 year old sample consisting of 41,057 students in 1735 schools in the 14 developed countries and found ***Achievement was significantly and postively related to the levels of Classroom Exploration.***

Mintzes (1982) examined the relationship between student perceptions of teaching behaviour and Learning Outcome in college biology. The finding was that ***Achievement was related to students' perceptions of the frequency of information: transmitting behaviour has some potentially important implications for teachers.***

Wright and ***Cowen (1982)*** conducted a study with a sample of 511 grade five and six students and their 23 teachers in USA and found that ***Teacher perceived involvement, affiliation, rule clarity, order and organization were related to more positive student mood and thereby greater Achievement.***

Doctor (1984) studied about the Classroom Climate, the psyche of pupils and their Achievement. 1279 pupils from all types of schools were

selected for the study. Results show that (i) each classroom had its own individuality (ii) a classroom with high Classroom Climate had high pupils psyche and (iii) ***Classroom Climate had consistency with Academic Achievement.***

In a study completed in Nigeria ***Okebukola (1984)*** has confirmed that ***Classroom Environment plays an important role in student Achievement.***

Fraser and ***O'Brien (1985)*** conducted a study on a sample of 758 grade three students in 32 classes. The association between ***Achievement measures and Classroom Environment dimensions were found to be quite strong, when the class means was used as the unit ot statistical analysis.***

Aulay (1990) conducted studies on class size and student Achievement with special reference to elementary settings and to students with behavioural defects. It was found that ***Achievement of a match between student preference and instructional setting was a necessary condition for maximising their cognitive, social and affective outcomes.***

Ames (1992) examined the Classroom Learning Environment in relation to Achievement goal theory of motivation. A perspective is presented, that argues for identification and analysis of classroom structures that can contribute ***to a mastery of orientation.***

A study conducted by ***Bing (1992)*** examined the effect of Classroom Climate on the mathematics Achievement of fourth-grade students in Tennessee public schools. The investigation used data obtained from 875 fourth-grade students enrolled in 42 classes in 13 public schools. It was found that ***higher and more equitable distributions of Achievement existed in***

classes with higher levels of academic emphases and student satisfaction, as well as in classes with low levels of tension.

Foong (1992) selected a sample of 900 grade VIII students to measure their attitudes towards science, perceptions of the science teacher, the Classroom Environment, the home environment, student motivation and peer influence. It was found that ***motivation, Classroom Environment and attitude toward science were the more significant and alterable variables for science Achievement.***

The study of ***Garcia (1992)*** examined the attitudes of fifth and sixth grade students from Chicago toward Classroom Climate in an effort to better understand factors that would encourage greater self-concept, higher-Achievement and student and teacher behaviour. The findings indicate that of ***the three items rated as strong positive aspects of Classroom Climate, two are teacher directed or teacher-caused: the teacher makes the subject interesting (72 percent) and the students are encouraged to ask questions (72 percent).*** The third highest-rated positive item was reflection of ***the students themselves in helping each other to do a good job.***

In order to find out the relationship between the pscyho-social characteristics of Classroom Environment, creative ability, academic self concept and Academic Achievement of secondary school pupils, a study was conducted by ***Padhi (1992).*** It was revealed that the ***creative ability and psycho-social characteristics of Classroom Environment of students were significantly related to their academic self concept and Achievement in school subjects.***

Sares (1992) explored the effect of school size on Walberg's model of educational productivity. Variables from the questionnaires used in the

National Longitudinal Study (NLS) of the high school class were matched with the productivity factors identified by Walberg. The result indicated ***significant support for Walberg's productivity factors, which include ability, age, motivation, instructional quality and quantity and home and Classroom Environment.***

Eight two year colleges in Northern California were chosen, by ***Catlin*** and ***Kalina (1993)*** to participate in a quantitative study of the relationship between student outcomes and the use of instructional methods recommended in the Cross/Angelo Classroom Assessment Model. Minority students felt more ***positive about Classroom Environment in classroom assessment classes than in control classes.*** Accordingly grade point average in Classroom assessment classes were not significantly higher than in control classes.

In a study conducted by ***Mc Robbie*** and ***Fraser (1993)*** the Science Laboratory Environment Inventory and skill and attitude measures were used to investigate associations between student outcomes and Classroom Environment for high school chemistry students. The nature of the ***Classroom Environment accounted for appreciable proportions of variance in both cognitive and affective outcomes beyond those attributable to general ability.***

A study reported by ***Waldrip*** and ***Giddings (1993)*** examined the relationship of current teaching practices to a number of variables that affected students' learning in science laboratory classrooms and which factors affected academic success in an external science Achievement examination. ***Science Academic Achievement was found related to quality and quantity of instruction and Science Laboratory Learning Environment.***

To enhance understanding of Classroom Climate effects on Language Achievement at the elementary level, ***Nunnery (1993)*** conducted an exploratory study which examined the cross-level interaction effects between student characteristics and student achievement. ***Significant relationships were found among Climate measures and student Achievement*** when analysis were conducted exclusively at an individual level and when conducted through hierarchical linear modelling.

OER (***1993*** - Office of Educational Research), New York reports a study in which Super Start Plus, a comprehensive integrated pre-kintergarten program that serves general education and special education children in the same classroom, was designed to provide a developmentally appropriate Classroom Environment to enhance the cognitive, social, physical, emotional, and language developments of three and four year old children. 337 general and special education students participated. The result indicated that ***both general and special education students showed significant gains in language development.***

Reymond (1993) conducted a study on character analysis of high school science Classroom Environment and attitude towards science. The results suggested that ***perception of their Classroom Environment affects the attitude and Achievement of students.***

Bryant (1994) examined the relationships between classroom quality and child outcomes among 145 Head Start children from home environment ranging from poor quality to more stimulating environments. It was found that ***children in higher quality Head Start classrooms performed better on measures of Achievement and preacademic skills than children in lower quality classrooms regardless of the quality of their home environment.***

Idiris and ***Fraser (1994)*** found in their study conducted in Nigeria, that higher scores on the negotiation, autonomy, investigation and differentiation scales of the CLES (Constructivist Learning Environment Survey) and ICEQ (Individualized Classroom Environment Questionnaire) were associated with more ***positive student attitudes, higher enquiry skill scores and thereby Achievement.***

Levine (1994) conducted an evaluation of computer-based instructional and learning system in science. Results from 40 classrooms with 1,153 students indicated the success of the program in fostering a ***Classroom Environment conducive to learning. As a result of the favourable Environment, the Achievement was found to increase.***

Pierce (1994) reports a case study that examined how an able middle school teacher of primarily high-risk students created a Classroom Environment that enhanced learner outcomes. Analysis of data collected through participant observation and interviews indicated that ***the normative nature of this particular classroom was intimately entwined with academic learning.***

Prebha (1994) conducted a study on a representative sample of 520 pupils of standard VII of eleven select secondary schools in a backward region of Malappuram district. A high ***Achievement mean was found to associate with students of good Classroom Climate schools.***

A study conducted by ***Rendon (1994)*** among college students, found that if the institution provides proper Classroom Environment and help the students to be successful, they were found ***becoming involved in campus academic and social life and developing positive attitudes about their learning ability and Academic Achievement.***

After doing a pilot project ***Hranitz*** and ***Shanoski (1994)*** expanded it to 25 other classrooms in two schools where teachers were trained and received support for restructuring their teaching methods and Classroom Environment. ***A comparison of their students' Achievement with control group showed significantly better science performance.***

Using the college Classroom Environment Scales and controlling for differences in class size, a study conducted by ***Vahala*** and ***Winston (1994)*** found significant differences in college students' perceptions of their Classroom Social Climates depending on institution type and academic discipline and that ***perceptions of Environment differentially affected students' grades in each discipline area.***

Basheer (1995) in a study, tried to find out the relationship between Science Learning Environment and Achievement in chemistry of standard X pupils. The study was conducted on a representative sample of 600 students of standard X in Malappuram district. The result revealed a ***positive relationship between Learning Environment and Achievement in chemistry.***

In a study, ***Goh*** and ***Fraser (1995)*** examined the nature and impact of two aspects of classroom learning (interpersonal teacher behaviour and Classroom Climate) on the affective and cognitive outcomes of elementary mathematics students in Singapore. Overall the different methods of analysis yielded consistent ***association between Classroom Environment and student outcomes.***

A study conducted by ***Handerson (1995)*** examined the association between Learning Environment and student outcomes in biology of Australian students. It was revealed that certain aspects of Learning Environment (integration of practical and theory work, the degree of open-

endedness, teachers' leadership behaviour and the level of students' responsibility and freedom) are ***positively linked with student outcomes.***

In the light of the findings ***Osterman*** and ***Krug, (1995)*** suggested that establishing ***a Classroom Environment conducive to learning is an essential for better Academic Achievement.***

For an investigation, ***Huang*** and ***Waxman (1996 a)*** used a sample of 180 resilient (those who can quickly adjust with their environment) and 180 non-resilient (those who cannot quickly adjust with their environment) Asian American students at six urban middle schools in a multicultural district in the Southern United States. ***The resilient students were found to exhibit significantly greater intrinsic desire to succeed and earn good grades.***

Huang and ***Waxman (1996 b)*** explored the enhancement of education for at-risk minority students by considering educationally resilient students and the Classroom Learning Environment. Data was collected from six middle schools in a multi-ethnic school district in a major metropolitan area in the south central region of the United States. Multivariate analysis and post-hoc tests of student responses showed that ***high Achieving students had significantly higher perceptions of involvement, affiliation, satisfaction, academic self concept and achievement motivation than did low Achieving students.***

Martin's (1996) study examined the teacher's role in creating a gender-sensitive environment in an all girls physics class and the effects of that Classroom Environment on girls' Achievement, self concept and career choices. In the results, ***the Classroom Environment was found to facilitate continuous growth and learning.***

Narayanan (1996) studied about Classroom Climate and attitude towards science on Achievement in biology of standard IX pupils of Kerala. 600 samples were selected for the study. It was found that the ***main effect of Classroom Climate on Achievement in biology was significant for the total sample as well as sub samples.***

Devi (1997) conducted a study on Home and School Environment and their influence on perceptual style. Analysis of data revealed that the Home and ***School Environment were responsible for perceptual abilities in children.***

A study conducted by ***Dunn*** and ***Kontos (1997)*** examines the relationship between DAP (Developmentally Appropriate Practice), Classroom Climate, social development and Academic Achievement of students. The research establishes the ***positive relationship between child initiated Environments and higher levels of cognitive functioning.***

In an action research ***Hodges*** and ***Wolf (1997)*** determined three areas of intervention; a positive relationship between student and teacher, positive interaction among peers and a positive and caring Classroom Environment. ***The post intervention data indicated an increase in positive self-esteem, greater student engagement in class activities and increased Achievement Levels.***

A qualitative work by ***Smith (1997)*** analyzes selected major literature on self-esteem from the stand point of urban youth education. The research supports the contention that the ***Academic Achievement of minority students can be increased significantly, if educators focus on Classroom Environment that promotes positive self-esteem.***

Cutietta (1998) examined the effects of participating in the St. Paul Chamber Orchestra's Neighbourhood Network of Education, Curriculum and Teachers (CONNECT) educational outreach program on children. It was found that children in CONNECT developed positive attitude toward school, an artistic identity, ***a positive view of the Classroom Environment, improved standardised tests scores and spatial intelligence.***

Greenberg (1998) explored the possible relationship between sixth grade students' perception of themselves and their Classroom Environment and their help seeking behaviours in mathematics classes. A city-wide survey was administered to sixth-grade Chicago public school students. The results indicated that the ***overall Achievement of the school had a direct relationship with different aspects of Classroom Environment.***

Hudley (1998) compared perceptions of Classroom Environment for Middle school students enrolled in two classrooms for African - American males at two different schools and similar students enrolled in the general education program at each school. ***The strong positive relationships among affiliation, teacher support, involvement, classroom order and task orientation were*** consistent with previous finding that African - American male classrooms have positive effect on relationships between students and their teacher as well as on students' attitudes toward academic activities and their own academic abilities.

Shear (1998) implemented a curriculum framework and internet – based software tool set called the Knowledge Integration Environment (KIE) in two urban schools serving diverse student population. The result indicated a proportionate ***improvement in cognitive engagement and learning with the conducive Classroom Environment.***

Young (1998 a) reports a study conducted to find out the Western Australian school effectiveness. Data were collected from 3397 students from 28 high schools in Western Australia. The study revealed that ***Classroom Environment was a powerful determinant of student ambition and Achievement.***

Kling and ***Zimmer (1999)*** conducted a project to develop and implement an interdisciplinary, thematic high school curriculum combining instruction in Spanish language and four arts disciplines. It was found that the project had a ***positive effect on student Achievement in language*** and art and persistence in Spanish language learning. Some factors in the interdisciplinary ***Classroom Environment were found to facilitate Achievement.***

Leonard (1999) reports a study on the interaction patterns of twelve sixth grade students who participated in a teacher research study on mathematical discourse, presenting data on teacher- student and student - student interaction patterns. It highlights how one white female student's participation and attitudes changed from passive to less passive between sixth and seventh grade. The results suggest that ***Classroom Environment*** can build girls' confidence in their ability in mathematics.

As reported by ***Molnar, et al. (1999),*** the SAGE programme (Student Achievement Guarantee in Education) was implemented on 131 kindergarteners, 2,508 first graders, 2,493 second graders and 2,572 third graders. Case studies, observations and teacher and principal questionnaire responses all ***supported the positive effect of the SAGE program on Classroom Envrionment.*** Besides scores on the achievement tests supported SAGE program's positive effect on Academic Achievement.

Yekovich, et al. (1999) report a study, in which the Technology-Rich Authentic Learning Environment (TRALE) program was used. The project aimed at improving young children's literary skills through the creation of a community of technology enriched Classroom Environment. It was implemented in kindergarten through grade III classrooms in one urban elementary school in the District of Columbia. The results suggested that ***TRALE increased student Achievement even during its first year of operation.***

Findings of ***Johnson's (2000)*** study indicate that a number of productivity factors (motivational factors of expectancy for success, locus of control, percieved usefulness of mathematics as well as parental aspirations, ***Classroom Environment,*** peer influence and television viewing patterns) ***are significantly related to the Achievement*** and attitude outcomes.

Cone, et al. (2000) tried to create a Classroom Environment conducive to develop social skills in the eighth graders. Cooperation in learning was encouraged. Following the interventions, ***many students showed a positive change in behaviour and academic performance.***

Hunn-Sannito, et al. (2001) report an action research project on the effects of classroom size on the quality of work conditions, Academic Achievement and students' behaviour. The kindergarten through third grade levels were targeted at three schools, one in a suburban setting and the other two in a growing rural area. The results showed that ***smaller class size with individualized attention (which created favourable Classroom Environment) improved students' behaviour and Achievement.***

Koutsoulis (2001) examined the influence of schools and teachers on students' attitudes and Academic Achievement, focussing on teacher

characteristics in relation to student Achievement. A total of 700 High school students from 25 classrooms within five schools in Cyprus completed three surveys. The data analysis indicated that ***students' Achievement was higher when they perceived their schools and classrooms as effective.***

Scantlebury, et al. (2001) describe the design, development, validation and use of an instrument that measures student attitudes and several environmental dimensions (ie standards-based teaching, home support and peer support). The use of the instrument indicated that ***Classroom Environment was the strongest independent predictor of both Achievement and attitude.***

2.2.3.2. Studies Showing Negative/Weak/No Relation

Although many studies on ***Classroom Environment*** and ***Achievement*** have shown a positive relation between these variables, the results are not always consistent. A few studies have shown a ***negative relationship*** between Classroom Environment and Achievement. Some of those studies are presented in this section.

Talmage and ***Walberg (1978)*** found in their study that the perceptions of proper ***Classroom Environment were associated with lower reading Achievement scores.***

In an Australian study ***Power*** and ***Tisher (1979)*** made use of Classroom Environment in predicting eight outcomes criteria (including Achievement). The sample consisted of 315 junior high school students in 20 classrooms. The result suggested the existence of a number of statistically significant ***but comparatively weak relationships between outcomes and Environment dimensions.***

Talton (1983) studied the effects of Classroom Environment on attitude and Achievement of a sample of 1,456 tenth grade students. It was found that ***Classroom Environment was*** strongly related to attitude but relatively ***weakly associated with Achievement.***

Payne (1992) used the Multi dimensional Motivation Instrument and the Classroom Environment Scale to examine the effects of the variables, motivation and Classroom Learning Environment on the verbal and mathematics Scholastic Aptitude Test (SAT) scores of approximately 300 black high school seniors. It was found that ***the Classroom Learning variable*** (except order and organization) ***had no significant effects on mathematics scores.***

Jack and ***Lizi (1993)*** conducted a quantitative study on Classroom Environment and Academic Achievement. Thirty eight eighth to tenth grade classrooms were taken into account. The results suggested that ***no significant relationship existed between Classroom Environment and Achievement.***

After conducting a pilot project, which was aimed at improving teacher motivation and pedagogical skills, student attitudes and Achievement and parent attitudes in science and mathematics education for kindergarten through grade III, ***Hranitz*** and ***Shanoski (1994)*** expanded it to 25 other classrooms in two schools where teachers were trained and received support for restructuring their teaching methods and Classroom Environment. A study of their students' Achievement compared with a control group showed ***no difference in mathematics.***

Finkelstein (1995) examined the impact of the Katz/Harry Faculty Development Model on teaching behaviours and student learning outcome

with 24 faculty members at four institutions in New Jersey. This model involved faculty pairs who observed one another's class, partner meeting to discuss shared experience in the classroom, several interviews with atleast three students and meeting with other faculty participants on campus to discuss experience. But ***no discernible increase in student Academic Achievement was found.***

Kumar (1995) studied the effect of cognitive style and Classroom Environment on Achievement in social science of standard IX pupils. 500 pupils were selected for the study. It was found that ***Classroom Environment had no significant main effect on Achievement.***

Wubbels (1995) tried to determine interpersonal style and Classroom Environment created by teachers according to their interpersonal profile. The results of the study suggested that ***teachers with disorderly classrooms had students with negative attitudes and low Achievement.***

Panikkar (1996) studied about the influence of attitude towards homework and Classroom Climate on Achievement in biology of secondary school students. 600 samples were taken for the study. The result revealed that there was significant negative relationship for girls and pupils in Government schools between the variables, Classroom Climate and Achievement in biology. The ***relationship was not significant and negligible for boys and pupils in rural and urban schools respectively.***

Sasidharan (1997) studied the influence of Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Langauge of standard VII pupils. The sample (n=110) was selected from two upper primary schools in Palakkad district. The results showed that students

who experienced ***below average Classroom Environment possessed higher Achievement*** than students who experienced above average Classroom Environment.

Results of the study conducted by ***Suresan (1997)*** revealed that students with ***high Classroom Environment showed only average Achievement in biology,*** whereas students with low Classroom Environment showed high Achievement.

Dunn and ***Harris (1998)*** examined some selected factors associated with Classroom Climiate as perceived by fourth - grade students and explored the relationship between those factors and student Academic Achievement. The findings indicated that ***Climate plays a relatively minor role in influencing Achievement.***

In an experimental adventure-based programme that was more academic than recreational, ***Elvy (1998)*** found that high school students were interested in Academic Achievement but ***indifferent to the typical Classroom Environment.***

For a longitudinal study of school effectiveness in Western Australia, ***Young (1998 b)*** collected data on the school environment, the Classroom Learning Environment, student background variables, teacher and student self-concept, teacher morale and science and mathematics Achievement for each of 849 students in four urban, ten rural and seven remote high schools. Virtually ***no variance in Achievement was explained by*** school-level variables, although some differences among classes might be attributable to differences in teacher characteristics, peer effects or ***Classroom Environment.***

2.2.3.3. Summary of Studies on Classroom Environment and Achievement

A summary of the reviewed studies on Classroom Environment and Achievement is presented in the following break up.

Year	Author	Result
1980	Kelly	Achievement was significantly and positively related to the levels of Classroom Exploration
1982	Mintzes	Achievement was related to students' perceptions of their Classroom Environment
1982	Wright and Cowen	The variables were positively correlated
1984	Doctor	Classroom Climate had consistency with Academic Achievement
1984	Okebukola	Classroom Environment plays an important role in student Achievement
1985	Fraser and O'Brien	Achievement measures and Classroom Environment dimensions were found to be strongly correlated
1990	Aulay	Positive relationship between the variables
1992	Ames	Significant positive effect
1992	Bing	Higher and more equitable distributions of Achievement existed in classes with higher levels of academic emphases and student satisfaction
1992	Foong	Classroom Environment and attitude towards science have positively significant effect on Achievement
1992	Garcia	Achievement benefits for Classroom Environment
1992	Padhi	Classroom Environment was positively related to students' Achievement
1992	Sares	The variables were positively correlated

1993	Catlin and Kalina	Students felt more positive about their Classroom Environment in classroom assessment classes than in the control classes
1993	Mc Robbie and Fraser	Classroom Environment was found accountable for higher Achievement
1993	Waldrip and Giddings	Achievement was found related to quality and quantity of instruction and Science Laboratory Learning Environment
1993	Nunnery	Significant relationships were found among Climate measures and student Achievement
1993	OER	Both general and special education students showed significant gains in language development
1993	Reymond	Students' perception of their Classroom Environment affects their Achievement
1994	Bryant	Classroom Environment has positive effect on Achievement
1994	Idiris and Fraser	Classroom Environment was found to associate with higher enquiry skill scores and thereby Achievement
1994	Levine	As a result of the favourable Environment, the Achievement was found to increase
1994	Pierce	Achievement benefits for Classroom Environment
1994	Prebha	A high Achievement mean was found to associate with students of good Classroom Climate schools
1994	Rendon	Significant positive effect on Academic Achievement
1994	Hranitz and Shanoski	Classroom Environment was found to correlate with Achievement
1994	Vahala and Winston	Perception of Environment differentially affected students' grades in each discipline area
1995	Basheer	Positive relationship between Learning Environment and Achievement in chemistry

1995	Goh and Fraser	Yielded consistent association between Classroom Environment and student outcomes
1995	Handerson	Learning Environment were positively linked with student outcomes
1995	Osterman and Krug	A Classroom Environment conducive to learning is an essential for better Academic Achievement
1996	Huang and Waxman	Higher Achievement was positively related with students who experience favourable Classroom Environment
1996	Huang and Waxman	Higher achieving students had significantly higher perceptions of involvement, affiliation, satisfaction, etc.
1996	Martin	The Classroom Environment was found to facilitate continuous growth and learning
1996	Narayanan	Main effect of Classroom Climate on Achievement was significant
1997	Devi	School Environment were responsible for perceptual abilities in children
1997	Dunn and Kontos	Positive relationship between child initiated Environments and higher levels of cognitive functioning
1997	Hodges and Wolf	Classroom Environment was positively related to student Achievement
1997	Smith	Classroom Environment promotes positive self-esteem and thereby Academic Achievement
1998	Cutietta	A positive view of the Classroom Environment improved standard test scores
1998	Greenberg	Overall Achievement of the school had a direct relationship with different aspects of Classroom Environment
1998	Hudley	Strong positive effect on Achievement

1998	Shear	Improvement in cognitive engagement and learning with the conducive Classroom Environment
1998	Young	Classroom Environment was a powerful determinant of student ambition and Achievement
1999	Kling and Zimmer	Positive effect on student Achievement in language
1999	Leonard	Classroom Environment can build girls' confidence in their ability in mathematics
1999	Molnar, *et al.*	Positive effect on Academic Achievement
1999	Yekovich, *et al.*	Favourable Classroom Environment increases student Achievement
2000	Johnson	Classroom Environment was positively related to Achievement
2000	Cone, *et al.*	Classroom Environment has positive effect on Achievement
2001	Hunn-Sannito, *et al.*	Classroom Environment improved students' behaviour and Achievement
2001	Koutsoulis	Students' Achievement was higher when they perceived their schools and classrooms as effective.
2001	Scantlebury, *et al.*	Classroom Environment was the strongest independent predictor of both Achievement and attitude
1978	Talmage and Walberg	Perceptions of proper Classroom Environment were associated with lower reading Achievement scores
1979	Power and Tisher	Comparatively weak relationship between Classroom Environment and student outcomes
1983	Talton	Classroom Environment was weakly associated with Achievement
1992	Payne	Had no significant effects on mathematics scores

1993	Jack and Lizi	No significant relationship between the variables
1994	Hranitz and Shanoski	No Achievement benefits
1995	Finkelstein	No discernible increase in student Academic Achievement
1995	Kumar	Classroom Environment had no significant main effect on Achievement
1995	Wubbels	The variables were negatively correlated
1996	Panikkar	The relationship was not significant
1997	Sasidharan	Students who experienced below average Classroom Environment possessed higher Achievement
1997	Suresan	Students with high Classroom Environment showed only average Achievement
1998	Dunn and Harris	Classroom Climate plays a relatively minor role in influencing Achievement
1998	Elvy	Students were interested in Academic Achievement but indifferent to the typical Classroom Environment
1998	Young	No Achievement benefits

2.3. META ANALYSIS

Meta analysis is the statistical summary of the results of all the studies on a topic (Glass, *et al.*, 1981). In this part of the chapter, the investigator attempts to present the meta analysis of the studies reviewed in respect of Cooperative Learning and Achievement, Cooperative Lerning and Retention and Classroom Environment and Achievement. This is done with a view to examine statistically the underlying trend of the variables, ***Cooperative Learning*** and ***Classroom Environment*** in relation to student ***Achievement*** and

Retention. For this purpose studies relating to Cooperative Learning and Achievement, Cooperative Learning and Retention and Classroom Environment and Achievement were analysed based on the positive and negative nature of the results. Percentage of studies on Cooperative Learning and Achievement, Cooperative Learning and Retention and Classroom Environment and Achievement both in positive and negative nature were computed. They are presented in Table 2.1.

TABLE 2.1

Percentage of Studies Having Positive and Negative Results with Cooperative Learning and Achievement, Cooperative Learning and Retention and Classroom Environment and Achievement

Variables	Number of Positive Studies	Per-centage	Number of Negative Studies	Per-centage	Number of Total Studies
Cooperative Learning and Achievement	54	76.1	17	23.9	71
Cooperative Learning and Retention	21	87.5	3	12.5	24
Classroom Environment and Achievement	53	77.9	15	22.1	68

The meta analysis indicates that Cooperative Learning and Classroom Environment have strong positive influence on Achievement. 76.1% of the studies on Cooperative Learning and Achievement, out of 71 studies reviewed yield Achievement benefits to the sample studied. But, 23.9% of the studies yield no achievement benefits. 87.5% out of 24 studies on Cooperative Learning and Retention show a positive relationship between the variables.

But 12.5% of the studies yield no Retention benefits with Cooperative Learning. In the case of Classroom Environment, 77.9% out of 68 studies reviewed, yield a strong positive influence on Achievement. At the same time, 22.1% of the reviewed studies show negative/weak/no relation with student Achievement. In short the overall research findings with regard to Cooperative Learning and Classroom Environment with student performance/Achievement and Retention are inconclusive in nature.

But the percentage analysis indicates the growing trend in the results of research on Cooperative Learning and Achievement, Cooperative Learning and Retention and Classroom Environment and Achievement in the positive direction, ie Achievement and Retention benefits in the case of Cooperative Learning procedures and positive influences of Classroom Environment on Achievement.

However, the investigator could not find any study showing the combined effect of Cooperative Learning and Classroom Environment on Achievement and Retention in Indian context.

Chapter 3

METHODOLOGY

- Selection of Variables
- Objectives and Hypotheses
- Design of the Study
- Procedure
- Summary of Procedure

3 METHODOLOGY

The present study was conducted in the form of a controlled experiment having ***two major phases***. In the first phase, it was aimed at finding out the effectiveness of ***Cooperative Learning Strategy (Jigsaw-II Model)*** over ***Conventional lecture Method of Teaching,*** if any, in terms of *Achievement* and ***Retention*** in Malayalam Language of standard VII pupils. In the second phase, it was intended to find out the main and interaction effects of ***Instructional Learning Strategies*** (Cooperative Learning and Conventional lecture Method) and ***Classroom Environment*** on ***Achievement*** and ***Retention*** in Malayalam Language of standard VII pupils.

The methodology adopted for this study is presented under the following headings.

3.1. SELECTION OF VARIABLES

The logical rationale in the selection of the variables viz., Independent Variables, Dependent Variables and Control Variables is presented in this section.

The investigator made a careful review of literature to identify the Instructional Learning Strategies developed on the basis of research on human learning and communication. These strategies also employ a combination of human and non-human resources to bring about desirable changes in school children. These were categorised under broad classification as varied Methods of Teaching, Models of Teaching and Strategies of Instruction and Learning. It is worthwhile to note that efficiency in learning depends on student characteristics both Cognitive and Non-cognitive and Socio-economic background of parents and other environmental variables having varied influence on teaching. These variables affecting student's performance in Malayalam Language were specifically selected for the experiment. The following variables related to Achievement in school subjects have been considered.

3.1.1. INDEPENDENT VARIABLES

Two ***Instructional Learning Strategies*** (Cooperative Learning Strategy - Jigsaw II Model - and Conventional lecture Method of Teaching) and ***Classroom Environment*** are the Independent Variables selected for the study.

3.1.1.1. Cooperative Learning Strategy

Cooperative Learning is a teaching-learning strategy in which small teams of heterogenous students use a variety of learning activities to improve their learning. Each member of a team is responsible not only for learning but also for helping team-mates learn. Many studies conducted abroad revealed that Cooperative Learning improved Academic Achievement, student behaviour, self confidence and motivation. Different kinds of Cooperative Learning Strategies have been developed so far. Some of them are; Learning Together (Johnson & Johnson, 1975), Group Investigation (Sharan & Sharan,

1976), Jigsaw Learning-I (Aronson, *et al.*, 1978), Jigsaw Learning-II (Slavin, 1980) and Student Teams Achievement Divisions (Slavin, 1983a). The ***Jigsaw-II Model*** was selected for the present study, as the different phases included in it seemed suitable for the development of the basic language skills.

In Jigsaw Learning, a learning task is jigsawed or cut into pieces that when fitted together recreate the total picture. Each ***base group*** of five or six students get a complete set of task sections and each student in the group takes the responsibility for one of these sections. After learning the sections of material, discussions take place in the ***expert groups*** for strengthening learning. After discussion the members return to their ***base groups*** and tutor other members in turn. Thus all of the members learn the total material. Tests are taken (individual or group) after learning and the highest scoring individuals/groups are appreciated.

3.1.1.2. Conventional Lecture Method of Teaching

Conventional Method refers to the method followed by most of the teachers conventionally. In Kerala state, Lecture Method can be considered as the Conventional Method, as most of the teachers have been following it for years. It may be due to the convenience of this method. Hence, ***Conventional lecture Method of Teaching*** was selected as one of the Instructional Learning Strategies.

3.1.1.3. Classroom Environment

As ***Classroom Environment*** is one of the strongest sociological variables, that can directly influence the outcomes of the learning process, it was also selected as one of the Independent Variables.

3.1.2. DEPENDENT VARIABLES

The study focuses on the effectiveness of Instructional Learning Strategies and Classroom Environment on the cognitive outcomes of the learners. Hence the Dependent Variables selected for the study are ***Achievement in Malayalam Language*** (a Total score and Objectivewise scores viz., Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation) and ***Retention in Malayalam Language*** (a Total score and Objectivewise scores viz., Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation) of standard VII pupils.

3.1.3. CONTROL VARIABLES

The investigator anticipated some attributes of the subjects that might intervene in the experimental situation. The outcome of the treatment might be affected by these factors. To overcome this problem, these variables were controlled statistically (using ANCOVA). Variables controlled for this purpose were, the ***Pre-experimental Status*** of the students in terms of their Achievement in Malayalam Language as measured by a Pretest (***Previous knowledge of the subject matter***), ***Verbal Intelligence and Non-verbal Intelligence.***

3.2. OBJECTIVES AND HYPOTHESES

The objectives formulated and hypotheses tested for the present study are described in the following sections.

3.2.1. OBJECTIVES

The present experiment has ***two major objectives.*** To examine the ***effectiveness of Instructional Learning Strategies (Cooperative Learning***

Strategy and Conventional lecture Method of Teaching) on Achievement and Retention in Malayalam Language of standard VII pupils was the first major objective.

The second major objective was ***to study the main and interaction effects of Instructional Learning Strategies (Cooperative Learning - Jigsaw II Model and Conventional lecture Method of Teaching) and Classroom Environment on Achievement and Retention*** in Malayalam Language of the sample.

The specific objectives formulated for the Experiment are presented as follows with a view to get an idea about the nature and purpose of this experiment.

3.2.1.1. To study whether there exists any difference or not in the mean ***Achievement scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

3.2.1.2. To study whether there exists any difference or not in the mean ***Gain scores*** of the Experimental and Control groups for the Total sample, Boys and Girls.

3.2.1.3. To study whether there exists any difference or not in the mean ***Retention scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

3.2.1.4. To study the effectiveness of ***Cooperative Learning Strategy*** over ***Conventional lecture Method of Teaching,*** if any, in terms of Achievement in Malayalam Language of standard VII pupils.

3.2.1.5. To study the effectiveness of ***Cooperative Learning Strategy*** over ***Conventional lecture Method of Teaching,*** if any, in terms of Retention in Malayalam Language of standard VII pupils.

3.2.1.6. To study the main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.1.7. To study the interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.1.8. To study the main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objetivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.1.9. To study the interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.2. HYPOTHESES

It is necessary for the experiment to formulate some assumptions regarding the expected outcomes of the study. In research methodology these assumptions are called ***hypotheses***. Hypotheses provide a clear path to the investigation and delimit the efforts of the investigator to certain pertinent

issues of the problem under study. Moreover, hypotheses always keep the investigator in touch with the main objectives of the study.

On the basis of the review of literature, the following hypotheses were formulated for the present experiment.

3.2.2.1. There will be no significant difference in the mean ***Achievement scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

3.2.2.2. There will be no significant difference in the mean ***Gain scores*** of the Experimental and Control groups for the Total sample, Boys and Girls.

3.2.2.3. There will be no significant difference in the mean ***Retention scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

3.2.2.4. Pupils taught through ***Cooperative Learning Strategy*** will not differ significantly from pupils taught through ***Conventional lecture Method of Teaching*** in terms of ***Achievement in Malayalam Language*** of standard VII pupils.

3.2.2.5. Pupils taught through ***Cooperative Learning Strategy*** will not differ significantly from pupils taught through ***Conventional lecture Method of Teaching*** in terms of ***Retention in Malayalam Language*** of standard VII pupils.

3.2.2.6. There will be no significant main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language***

(Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.2.7. There will be no significant interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.2.8. There will be no significant main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.2.2.9. There will be no significant interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

3.3. DESIGN OF THE STUDY

The true Experimental Design was selected for the present study. The particular experimental design selected is explained as follows.

3.3.1. RESEARCH DESIGN SELECTED

The ***Pre test - Post test Equivalent - Groups Design*** was selected for the study. This design is illustrated as follows.

G_1 $O_1 X O_2$

G_2 $O_3 C O_4$

O_1O_3 - Pretest

O_2O_4 - Post test

$O_2 - O_1$, $O_4 - O_3$] Gain score

G_1 - Experimental group

G_2 - Control group

X - Application of the Experimental treatment

C - Application of the Control treatment

3.4. PROCEDURE

The procedure of the study is presented as follows.

3.4.1. THE SAMPLE

Pupils of upper primary schools in Kerala state were considered as the population for the present study. As it is an experimental study, it was difficult to collect data from a large sample. Therefore, two ***intact*** class divisions from two schools were selected for treatment. The Experimental and Control schools were selected at random by tossing the coin. Certain aspects of the two schools were considered in the selection to ensure the equivalence of the groups. These aspects are described as follows.

3.4.1.1. Rural-Urban Locality: The two schools selected were situated in semi-urban areas of Palakkad district.

3.4.1.2. Sex: The two schools selected were co-educational institutions.

3.4.1.3. Instructional Efficiency: It is an important criterion which decides more or less the quality of learning of the pupils. Equality of the instructional

efficiency of the subjects of the two groups (classes) were ensured by comparing the results in the terminal examination in the previous year.

The convenience of the schools to conduct the experiment and the physical distance between the two schools (so that the students of the two groups cannot mingle mutually) were also considered in the selection of the sample. The two classroom groups were equated in their Previous Knowledge of the subject matter (Pretest score), Verbal Intelligence, Non-verbal Intelligence and Socio-Economic Status. Appropriate tools were used for this purpose.

3.4.1.4. Allocation of Experimental and Control Groups

Two intact classroom groups (standard VII) from two schools in Palakkad district were selected for the experiment. The schools were allocated as ***Experimental*** and ***Control*** groups by the toss of a coin.

Details of the schools are given as follows:

Sl. No.	Name of School	Nature of Group
1.	G.U.P. School, Naripparamba	Experimental group
2.	G.M.U.P. School, Vilayur	Control group

Actual number of subjects in the Experimental and Control groups at the entry stage of the experiment are shown in the break up.

Sample	Experimental Group	Control Group	Total
Boys	23	33	56
Girls	33	21	54
Total	56	54	110

The ***Experimental group*** was taught through ***Cooperative Learning Strategy (Jigsaw-II Model)*** and the ***Control group*** was taught through ***Conventional lecture Method of Teaching.***

3.4.2. SELECTION OF THE TOPIC FOR TREATMENT

The topic for treatment in the present study was selected from the syllabus prescribed for standard VII pupils of Kerala state for the academic year 2000 - 2001. The curriculum, syllabus and text book prescribed were studied carefully before selecting the topic. Also, the investigator consulted with experts and teachers concerned. Thus six prose lessons and three poems (total nine lessons), including language exercises (grammar and structure) were selected. The prose lessons were ***Eenathil Thalathil, Kathayum Kaliyum, Irulum Velichavum, Sastrathinte Mantrikacheppu, Kashmir Thazhvarayil*** and ***Vijayathil Pothinja Parajayam.*** The poems selected were ***Pootha Mavineppatti, Maveliyam Varavathunde*** and ***Bodhavati.*** All lessons were examined thoroughly and found amenable to Cooperative Learning (Jigsaw-II Model) and Conventional lecture Method of Teaching. Considering the activities based on the content, structure, grammar and wholeness of appreciation, each of the nine lessons was divided into three subunits. Thus the total topic was divided into 27 subunits. For the Experimental treatment (Cooperative Learning Strategy - Jigsaw II) 27 lesson transcripts (one each for

each subunit) were prepared for 27 periods (each of 90 minutes duration). Thus the duration of the Experimental treatment was fixed at 40 hours and 30 minutes. For the Control treatment (Conventional lecture Method) 54 lesson transcripts (two each for each subunit) were prepared for 54 periods (each of 45 minutes duration). Thus the duration of the Control treatment was fixed as equal to the duration of the Experimental treatment (40 hours and 30 minutes). These divisions of the lessons were found suitable for applying Cooperative Learning Strategy and Conventional lecture Method of Teaching.

3.4.3. TOOLS USED FOR TREATMENT

Description of the tools used for treatment (Instructional materials) is presented in this section.

3.4.3.1. Lesson Transcripts for Cooperative Learning Strategy (Jigsaw-II Model)

Literature regarding different types of Cooperative Learning Strategies were reviewed by the investigator, such as ***Learning Together*** (Johnson & Johnson, 1975); ***Group Investigation*** (Sharan & Sharan, 1976); ***Jigsaw Learning*** (Aronson, *et al.*, 1978); a modification of Aronson's Jigsaw Learning – ***Jigsaw II*** (Slavin, 1980); ***Teams-Games-Tournaments*** – TGT (De Vries, *et al.*, 1980); ***Student Teams Achievement Divisions*** – STAD (Slavin, 1983a); ***Team Assisted Individualisation*** – TAI (Slavin, *et al.*, 1984); ***Numbered Heads Together*** – NHT (Olsen & Kagan, 1992); ***Think Pair Share*** – TPS (Andrini, 1994) and ***Complex Instruction*** – CI (Cohen, 1998). After a scrutiny of these Cooperative Learning Strategies and discussions with experts, the investigator selected the modified Jigsaw Learning (Jigsaw-II) as the particular Cooperative Learning Strategy for the present study. In Jigsaw Learning, a

learning task is ***jigsawed*** or ***cut*** into pieces that when fitted together, recreate the total picture. Each group of ***five or six*** students get a complete set of task sections and each student in the group ***takes the responsibility for learning one of these sections***.

The investigator thought that this type of division of the content and the group work would be effective in learning Malayalam Language. Because, as Rendon (1991) has pointed out, sharing of learning processes only ***strengthens the language skills*** that students are to learn and also exposes to important social skills. Hence the investigator selected Jigsaw-II Model of Cooperative Learning for experiment and prepared Lesson Transcripts for it. Description of the various stages in the preparation of the Lesson Transcripts is presented as follows.

Planning

After fixing the Jigsaw-II Model of Cooperative Learning as the Experimental Variable for the present study, the investigator decided to prepare Lesson Transcripts for this strategy. For this, total topic were studied thoroughly. The suggestions of experts in the field were sought. Besides, suggestions given by Aronson, *et al.* (1978) and Slavin (1980) for the successful functioning of a Cooperative Classroom (Jigsaw-II Model) were studied carefully.

Preparation

The investigator prepared Lesson Transcripts for Jigsaw-II Model of Cooperative Learning according to the suggestions of Aronson, *et al.* (1978) and Slavin (1980). The topics selected for treatment were divided into 27 sub-units (nine lessons of three sub-units each). Thus 27 Lesson Transcripts for Cooperative Learning were prepared (one each for each sub-unit). The ***topic***

selected and the ***specific objectives*** set for each learning unit was the same for the Experimental and Control treatments.

The investigator followed a ***sequential pattern*** in the preparation of the draft Lesson Transcripts for Cooperative Learning Strategy (Jigsaw-II Model). The sequence was in ***four phases***. The Jigsaw-II Model completes when the four phases are over. Each ***phase*** is described as follows.

Phases	Activity	Functioning
Phase I	Formation of ***Base groups***	Students are asked to count the numerals 1 to 7. Those who count '1' form the Ist group, '2' form the IInd group and so on. Thus seven groups consisting of seven members are formed. The same learning material which contains seven different sections are provided to these Base groups. Each member in the Base group takes the responsibility for learning one of these sections.
Phase II	Formation of ***Expert groups***	After learning the material provided to the Base group, members who get the same section are met in the Expert group to strengthen the learning of their own sections.
Phase III	Returning from ***Expert groups to the Base groups***	With a mastery of learning sections concerned, members return from the Expert group to the Base group. Each member in the Base group tutors the others in turn, ie peer teaching is taking place.
Phase IV	***Rewarding*** the groups for successful completion of the task	After learning the whole section, a quiz programme between the groups take place. Group or groups which perform well in the quiz programme are rewarded and appreciated.

The Try out

The draft Lesson Transcripts were tried out by the investigator on 50 pupils of standard VII in a school, to work out its application in the experimental situation.

a. Base Group Formation

Pupils were asked to form seven groups consisting of seven members before the try out was started. For this, the students were asked to count the numerals 1 to 7; all the students who count the number '1' were formed in to the Ist group and all the students who count the number '2' were formed into the IInd group and so on. Thus seven groups of seven members were formed and the students were asked to put separate names to the groups.

b. The Seating Arrangement

In a Cooperative Learning situation the seating arrangement has to be organised in such a manner, so that ***each pupil can see all of the other pupils, the teacher and the learning materials***. The way, the teacher organises the classroom especially primary classroom exerts a powerful influence on both teaching and learning (Cohen, *et al.*, 1996). The diagramatic representation of the classroom seating arrangement for the Cooperative Learning Strategy is presented in Figure 3-1.

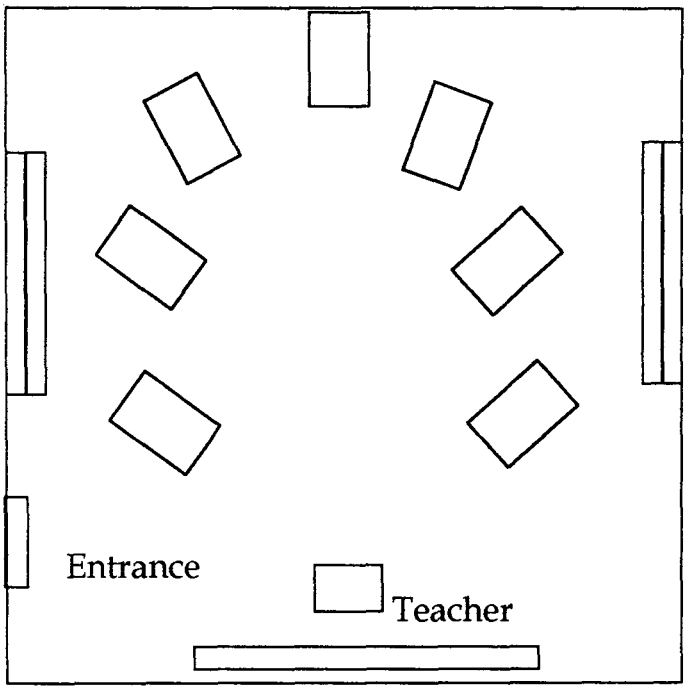


FIGURE 3-1 Classroom Seating Arrangement

After forming the Base groups, the same learning material consisted of seven different sections were provided to the groups. Each member of the Base group learned their own section.

c. Expert Group Formation

After learning the material provided to the Base group, members who got the same section met in the Expert group to attain mastery in their sections. A discussion took place in the Expert group and then the members returned to the Base group and took part in peer tutoring. At last a quiz competition took place between and among the groups and the winning group was appreciated.

Teachers concerned in the school were invited for attending the try out session and their ***opinions*** were sought. On the basis of the suggestions given by the teachers and the feed back from the students who participated in the tryout, the draft Lesson Transcripts were modified and finalised. Model Lesson Transcripts in Malayalam and in English are presented in Appendix IA, IB and Appendix IIA, IIB respectively.

3.4.3.2. Lesson Transcripts for Conventional Lecture Method of Teaching

The Investigator also prepared Lesson Transcripts for Conventional lecture Method of Teaching, for the Control group on the basis of Principles of ***Objective Based Instruction*** followed in almost all the primary schools in Kerala. The different steps included in the Lesson Transcripts are described as follows.

I. Introduction: It includes testing of the previous knowledge and motivating the learners to receive the lesson.

II. Development: It consists of presentation of the objectives, presentation of the content, selection of learning experience and appropriate evaluation techniques and

III. Review and Assignment: This includes the final review of the material taught.

Conventional lecture Method of Teaching was used for the Control group. No separate teaching aids were made for Control group, but available teaching aids in the school were used. A copy of the Lesson Transcript for Conventional lecture Method of Teaching in Malayalam is presented in Appendix III.

3.4.4. OTHER TOOLS USED

The tools used to measure the other Independent Variable, ***Classroom Environment*** and Control Variables, ***Verbal Intelligence*** and ***Non-verbal Intelligence*** and other tools namely ***Pretest, Achievement test, General Data Sheet*** for Assessing Socio-Economic Status and ***Classroom Interaction Rating Scale*** are described in this section.

3.4.4.1. Classroom Environment Inventory

For the present study, a ***Classroom Environment Inventory*** prepared by Pillai and Sunitha (1996) was used to measure the perceptions of students to their Classroom Environment. Fifty items are there in the inventory. The items are in the form of statements. Each item is rated in a two point scale representing '***Yes***' and '***No***'. The respondent has to choose any one of them. Items are written so as to record the nature of the ***teacher-pupil relationship, pupil interaction, the social*** and ***emotional climate*** in the classroom, ***competence in learning*** and ***facilities provided for self-learning*** in and outside the classroom. The ***positive items*** ('Yes' - response) only are scored with ***one*** score each.

The Classroom Environment Inventory was constructed in such a way that it covers the different dimensions of the Classroom Environment. Each item in the inventory was prepared by the scale description of ***My Class Inventory*** developed by Fraser, *et al.* (1982). Thus the ***content validity*** and ***construct validity*** were ensured.

The ***reliability*** of the inventory was estimated through the ***test-retest-*** method. The coefficient of correlation was found to be 0.64.

An example for the items included in the inventory is given as follows.

Example

		Yes	No
1.	The pupils in my class help each other.	( )	( )

A copy of the inventory in Malayalam and a copy of its English version are presented in Appendix IV and Appendix V respectively.

3.4.4.2. Verbal Group Test of Intelligence (VGTI)

In the present study, the Control Variable ***Intelligence (Verbal)*** was measured using the Verbal Group Test of Intelligence developed and standardised by Kumar, *et al.* (1997). The test battery consists of five sub tests, each consists of twenty items. The duration of the test is one hour. The details of the subtests are given in the succeeding sub-sections.

Test I - Verbal Analogy

This test involves the ability to find out the relationship between two things or ideas and to apply the same to other situations. To each item ***three words*** are given with the ***fourth one missing***. The subject has to find out the missing word from the four alternatives.

Example

1. Ship : Captain :: Aeroplane: _____

A. Sea B. Airport C. Driver D. Pilot

A	B	C	D✓

Test II - Verbal Classification

In this subtest, each item is a ***set of four words, of which three can be grouped together according to some principle or law.*** The subject has to choose that word which stands out of this group.

Example

1. A. Bus B. Aeroplane C. Cycle D. Lorry

A	B✓	C	D

Test III - Numerical Reasoning

In this sub test items may be a little ***bit confusing.*** These are of simple arithmetic, ***need no paper pencil work.*** Speed and accuracy of the response may be used to have a keen awareness of the subjects. Items in this subtest includes ***series*** types, ***odd man out*** and ***analogy*** type items. The mental process involved in answering this type of items require the perception of some sort of relationship between the given numbers.

Examples.

Series type

1. 2, 4, 6 _____, 10

A. 5 B. 8 C. 7 D. 11

A	B✓	C	D

Odd-man out types

2. A. 1 B. 5 C. 25 D. 75

A✓	B	C	D

Analogy type

3. 3 : 5 :: 11: _____

A. 12 B. 13 C. 14 D. 15

A	B✓	C	D

Test IV – Verbal Reasoning

A problem requiring the perception of some sort of ***relationship and its identification*** is given. The subject has to select the correct answer to the problem from the four alternatives. If carefully attempted, it can provide the correct answer within a limited time.

Example

1. 'F' is the brother of 'A', 'C' is the daughter of 'A', 'K' is the sister of 'F' and 'G' is the brother of 'C'. Then who is the uncle of 'G'.

A. F B. C C. K D. A

A✓	B	C	D

Test V - Comprehension

Items in this subtest are in the form of ***puzzles involving several relationships of qualities and persons***. In this test, four types of items are included. Under each type of items, five questions are given. At first the subject is required to understand and analyse the relationship given in each type of items. Then the subjects have to choose the correct answer for the five questions put at the end of each type of items from the given alternatives.

Example:

1. P, Q, R, S, T and U are sitting in two rows. In each row three persons are sitting face-to-face. The position of 'R' is second from the left side of 'P'. 'Q' and 'T' are sitting face-to-face. 'R' is not the neighbour of 'Q'. 'S' and 'P' are sitting in opposite direction.

1. In the given alternatives, which set of persons are sitting in the same row?

   A. PTR B. PQR C. UTS D. PUS

A✓	B	C	D

Validity of the VGTI

Validity of the Verbal Group Test of Intelligence was established using ***criterion related*** technique. The validity coefficients obtained (Sub-testwise and Total test) are given in Table 3.1.

TABLE 3.1

Validity Coefficients Obtained for Verbal Group Test of Intelligence (Sub-testwise and Total test)

Sl. No.	Components of VGTI	Obtained 'r'
1.	Verbal Analogy	0.5498**
2.	Verbal Classification	0.5436**
3.	Numerical Reasoning	0.5249**
4.	Verbal Reasoning	0.4041**
5.	Comprehension	0.4606**
6.	Total Test	0.6557**

** P<0.01

Since the content was adapted from reputed tests of Verbal Intelligence, the VGTI possesses ***high level of content validity*** as reported by the test constructors.

Reliability of the VGTI

Reliability of the VGTI was established using the ***split-half method*** and the reliability coefficient was corrected using Spearman Brown Prophecy formula. The reliability coefficients of the five Sub-tests and the Total test are given in Table 3.2.

TABLE 3.2

Reliability Coefficients Obtained for Verbal Group Test of Intelligence (Sub-testwise and Total test)

Sl. No.	Tests	Obtained 'r'
1.	Verbal Analogy	0.6636**
2.	Verbal Classification	0.5649**
3.	Numerical Reasoning	0.7214**
4.	Verbal Reasoning	0.6328**
5.	Comprehension	0.4700**
6.	Total Test	0.8283**

**P<0.01

The validity and reliability coefficients indicated that the test is a ***valid*** as well as ***reliable*** measure of Intelligence (Verbal). The internal structure of the VGTI was examined by correlating the ***Component-wise score with Total score on the VGTI.*** The intercorrelation matrix is presented in Table 3.3.

TABLE 3.3

Inter Correlation of the Components of Verbal Group Test of Intelligence with Total score

Sl. No.	Components	Verbal Analogy	Verbal Classi-fication	Numerical Reasoning	Verbal Reasoning	Compre-hension	Intelligence (Total)
1.	Verbal Analogy	(..)	0.6209**	0.4177**	0.433**	0.3457**	0.7623**
2.	Verbal Classification		(..)	0.4203**	0.41219**	0.3954**	0.7692**
3.	Numerical Reasoning			(..)	0.4653**	0.4652**	0.7673**
4.	Verbal Reasoning				(..)	0.4079**	0.7171**
5.	Comprehension					(..)	0.6896**

** $P < 0.01$.

One copy each of the Verbal Group Test of Intelligence in Malayalam, its English version and its Response sheet are presented in Appendix VI, Appendix VII and Appendix VIII respectively.

3.4.4.3. Standard Progressive Matrices Test (SPM)

This test is aimed at measuring the Control Variable, ***Non-verbal Intelligence.*** This Non-verbal test, developed by Raven (1958) was used to estimate the subject's ability to ***discern and utilize a logical relationship presented by non-verbal materials.*** The test consists of ***five sub-tests of twelve items each.*** In each item a part of the geometrical design is missing. Six or eight alternatives are given for each design. All of those fit the missing part, but only one logically belongs to it. The test is a popular measure of the 'g' factor of Intelligence.

The ***validity*** of the test was estimated in a variety of usual ways. When Stanford-Binet Test was used as the ***criterion,*** correlation varied from ***0.50 to 0.86.*** The reliability coefficients of the test vary from ***0.80 to 0.90,*** as reported by Raven. In a Kerala study (Nair, 1972) the reliability coefficients were found

to vary from 0.70 to 0.86 by split-half method and from 0.84 to 0.91 by test-retest method.

3.4.4.4. Pretest

Achievement Test in Malayalam Language (ATML) for standard VII pupils, prepared by the investigator was used as the Pretest. The procedure undertaken in the preparation of ATML is described in section 3.4.4.5. Before the treatment, the subjects both in the Experimental and Control groups were given the same Pretest inorder to measure the initial status of the students interms of the Achievement in Malayalam Language. The ATML was also used as the Post test and the test for measuring Retention one month after the completion of the treatment.

3.4.4.5. Achievement Test in Malayalam Language (ATML)

Measures on criterion tests are necessary for determining the effectiveness of Learning Strategies (Cooperative and Conventional). So an Achievement Test in Malayalam Language was prepared by the investigator on the topics selected for treatment. The Achievement test was based on the ***Taxonomy of Educational Objectives*** suggested by Bloom (1979). This test was used as the Pretest, the Post test-I and the Post test-II (Retention test) in the present study. The procedure adopted for the construction of Achievement Test in Malayalam Language is described in the following sub-sections.

a. Planning of the Test

The curriculum, syllabus and text book of Malayalam Language for standard VII pupils for the academic year 2000-2001 were thoroughly studied

by the investigator. Also, the investigator consulted with subject experts and experienced teachers in Malayalam Language for guidance. Moreover, the following books were referred for framing items for the test.

1. ***Language Testing*** (Lado, 1961)
2. ***Taxonomy of Educational Objectives*** (Bloom, 1979)
3. ***Essentials of Educational Measurement*** (Ebel & Frisbie, 1991)
4. ***Principles of Language Learning and Teaching*** (Brown, 1994)

There are ***Objective type, Short answer type*** and ***Paragraph type*** items in the Achievement Test. The duration of the test was fixed at 90 minutes. In Objective type test items, there are two types of items, they are ***fill in the blanks*** and ***multiple choice*** items. In Short answer type, the answer should be in ***one*** or ***two*** sentences. In Paragraph type, the answer should be in a ***paragraph*** (minimum five sentences). The maximum marks fixed for the test was 93.

b. Preparation of the Test

Items for the Achievement Test in Malayalam Language were prepared on the basis of the major Objectives in the ***cognitive domain*** namely Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. In the preparation of the test, due weightages were given to the Objectives, Content and Form of questions.

c. Weightage to Objectives

The weightage given to different Objectives for the Achievement Test is given in Table 3.4.

TABLE 3.4

Weightage to Objectives

Sl. No.	Objectives	Marks	Percentage
1.	Knowledge	20	21.5
2.	Comprehension	20	21.5
3.	Application	18	19.4
4.	Analysis	19	20.4
5.	Synthesis	8	8.6
6.	Evaluation	8	8.6
	Total	93	100

d. Weightage to Content

After a thorough analysis, the investigator divided the teaching unit into sub-units for determining the weightage to be given. By this, adequate weightage could be given for each sub unit. The weightage given to each sub-unit is presented in Table 3.5.

TABLE 3.5

Weightage to Content

Sl. No.	Content	Marks	Percentage
1.	Knowledge of Content	35	37.6
2.	Language	33	35.5
3.	Appreciation	25	26.9
	Total	93	100

e. Weightage to Form of Questions

As this is a Test in Malayalam Language, the investigator included Objective type, Short answer type and Paragraph type questions. This is done for giving due emphasis to basic language skills (Listening, Speaking, Reading and Writing). Since there are enough Paragraph type questions, Essay type questions were excluded. The relative weightage given to the Form of questions is given in Table 3.6.

TABLE 3.6

Weightage to Form of Questions

Sl. No.	Form of Questions	No. of questions	Marks	Percentage
1.	Objective type	30	30	32.2
2.	Short answer type	9	18	19.4
3.	Paragraph type	9	45	48.4
	Total	48	93	100

d. The Blue Print

A three dimensional grid (blue print) specifying the content covered by the test in relation to the weightage assigned for different objectives and three forms of questions, was prepared by the investigator. The investigator took special care to link the items with four basic language skills. The items for the draft test were prepared on the basis of this blue print. The blue print is presented in Table 3.7.

TABLE 3.7

Blue Print for Achievement Test in Malayalam Language

Objectives	Knowledge			Comprehension			Application			Analysis			Synthesis			Evaluation			Total
Form of Questions / Content Area	O	S	P	O	S	P	O	S	P	O	S	P	O	S	P	O	S	P	
Knowledge of Content	7 (7)	1^{S4} (2)	1^{S4} (5)	3 (3)	1^{S4} (2)	1^{S4} (5)	2 (2)			2 (2)			1 (1)		1^{S4} (5)	1 (1)			21 (35)
Language	2 (2)	1^{S4} (2)		2 (2)			4 (4)		$^{S2}2^{S4}$ (10)	2 (2)	$^{S3}2^{S4}$ (4)	1^{S4} (5)		1^{S1} (2)					17 (33)
Appreciation	2 (2)			1 (1)	1^{S4} (2)	1^{S4} (5)		1^{S4} (2)		1 (1)		1^{S4} (5)					1^{S4} (2)	1^{S4} (5)	10 (25)
Total	11 (11)	2^{S4} (4)	1^{S4} (5)	6 (6)	2^{S4} (4)	2^{S4} (10)	6 (6)	1^{S4} (2)	$^{S2}2^{S4}$ (10)	5 (5)	$^{S3}2^{S4}$ (4)	2^{S4} (10)	1 (1)	1^{S1} (2)	1^{S4} (5)	1 (1)	1^{S4} (2)	1^{S4} (5)	48 (93)
	14 (20)			10 (20)			9 (18)			9 (19)			3 (8)			3 (8)			

Note: The letter 'O' indicates Objective type items, 'S' Short answer type items, 'P' Paragraph type items, ^{S1} Listening skill, ^{S2} Speaking skill, ^{S3} - Reading skill and ^{S4} - Writing skill. Figures in bracket indicate the marks and those outside the bracket indicate number of questions.

Based on the blue print 96 items were prepared for the draft test (double items intended for the final test). All items were prepared, giving due weightages to ***six Instructional Objectives*** and ***four Language Skills***. The answers for the Objective type items should be in one word or in one sentence, which can be selected from the given four alternatives. For the Short answer type items, answers should be in one or two sentences. For the Paragraph type items the answer should be in one paragraph (minimum five sentences). Separate answer sheets were given to the students. Examples of the items are given as follows:

Example for Objective type item - Fill in the blanks.

1) _____ is the determinant of heredity

(a) gene (b) cell (c) blood (d) lymph

Example for Objective type item – Answer to the question.

1. Who among the following isn't related with the Onam myth?

(a) Pakkanar (b) Vamanan (c) Mahabali (d) Devendran

Example for Short answer type item.

1) What is meant by Genetic Engineering?

Example for Paragraph type item.

1) Describe the distinctive features of Woolar lake.

A copy of the Achievement Test in Malayalam Language (draft) is presented in Appendix IX.

The Try out

The draft test was tried out by the investigator on a representative sample of 100 students in two class divisions of standard VII in a school other than the Experimental and Control subjects were selected. Before administration, the purpose of the test was made clear to the subjects. Sufficient number of the test material and response sheets were provided to the students. All the necessary guidelines were included in the test and additional information needed were given by the investigator. All the response sheets were collected and scored with the help of scoring key and value points.

Item Analysis

The procedure suggested by Ebel and Frisbie (1991) was used for item analysis of the Objective type items. The scored response sheets were arranged in the descending order of the scores. The scores obtained by upper 27 subjects (27%) and lower 27 subjects (27%) were taken as the upper group and lower group respectively. For selecting the items for the final test, the ***difficulty index/facility value*** and the ***discriminating power*** of each item were found out. Discriminating power was calculated for all of the items, where as, difficulty index was calculated only for the Objective type items and facility value was calculated only for the Short-answer and Paragraph type items.

Difficulty Index

The difficulty index for each item was considered as the percentage of the group who have given the correct response to the item. It is inversely proportionate to the actual difficulty of the item, that is, ***the larger*** the index ***the easier*** the item.

The following formula suggested by Ebel and Frisbie (1991) was used to compute the difficulty index of each item.

$$\text{Difficulty Index} = \frac{U + L}{2N}$$

where,

U - The number of correct response in the upper group

L - The number of correct response in the lower group

N - The number of subjects in each group

Discriminating Power

The higher the average discrimination index for items in a test, the more variable the scores are likely to be and the more reliable the scores are expected to be (Ebel & Frisbie, 1991). The discriminating power of each item was found out using the formula

$$\text{Discriminating Power} = \frac{U - L}{N}$$

where,

U - The number of correct response in the upper group

L - The number of correct response in the lower group

N - The number of subjects in each group.

Facility Value

For Short answer and Paragraph type items ***two*** and ***five*** scores were allotted respectively for a fully correct response, if it was identical with the

scoring schemes. The scores varied depending on the response given by the subjects. Hence, for Short answer and Paragraph type items, the item analysis was done by calculating the ***facility value*** suggested by Harper as reported in Association of Indian Universities (1977). The formula used for this purpose was

$$\textbf{Facility Value} = \frac{\textbf{Sum of marks obtained by all candidates}}{\textbf{Sum of maximum marks obtainable on that item}}$$

The difficulty index/facility value and the discriminating power of each item are given in Table 3.8.

TABLE 3.8

Difficulty Index/ Facility Value and Discriminating Power of 96 items of Achievement Test in Malayalam Language for Standard VII Pupils

Item No.	U	L	DI/FV in %	DP	Item selected
1	27	15	0.77	0.44	
2	24	12	0.66	0.44	
3	12	8	0.37	0.15	
4	15	5	0.37	0.37	*
5	20	7	0.50	0.48	*
6	18	6	0.44	0.44	*
7	19	4	0.43	0.56	*
8	15	12	0.50	0.11	
9	27	15	0.77	0.44	
10	20	7	0.50	0.48	*
11	25	9	0.63	0.59	*
12	23	7	0.56	0.59	*
13	23	7	0.56	0.59	*
14	24	10	0.63	0.52	*
15	23	12	0.65	0.41	
16	22	7	0.54	0.56	*
17	17	6	0.43	0.41	*
18	18	2	0.37	0.59	
19	15	4	0.35	0.41	*
20	26	6	0.59	0.74	*
21	25	15	0.74	0.37	
22	12	12	0.44	0	
23	15	7	0.41	0.29	
24	20	5	0.46	0.56	*
25	25	8	0.61	0.63	*
26	12	8	0.37	0.15	
27	27	14	0.76	0.48	
28	6	6	0.22	0	
29	25	7	0.59	0.67	*
30	19	5	0.44	0.52	*
31	8	5	0.48	0.11	
32	17	5	0.41	0.44	*
33	6	8	0.26	-0.07	
34	23	13	0.67	0.37	
35	15	4	0.35	0.41	
36	21	7	0.52	0.52	*
37	18	8	0.48	0.37	
38	3	7	0.19	-0.15	
39	3	4	0.31	0.33	
40	18	4	0.41	0.52	*
41	11	8	0.35	0.11	
42	23	5	0.52	0.67	*
43	27	8	0.65	0.70	
44	14	12	0.48	0.07	
45	23	2	0.46	0.78	*
46	20	7	0.50	0.48	*
47	25	4	0.54	0.78	*
48	25	3	0.52	0.81	*
49	23	8	0.57	0.63	*
50	8	11	0.35	-0.11	
51	4	2	0.11	0.07	
52	21	3	0.44	0.67	*
53	23	4	0.50	0.70	*
54	14	4	0.33	0.37	
55	10	2	0.22	0.29	
56	7	7	0.26	0	
57	9	1	0.2	0.3	*
58	4	6	0.19	-0.07	
59	9	8	0.31	0.04	
60	18	5	0.43	0.48	*
61	4	0	2.5	0.15	
62	13	1	12	0.44	*
63	9	0	10	0.33	
64	19	0	20	0.70	*
65	23	6	52	0.63	*
66	18	1	21	0.63	*
67	16	0	13	0.59	
68	3	0	1.5	0.11	
69	20	4	29	0.59	*
70	4	0	4	0.15	
71	26	3	35	0.85	*
72	25	4	49	0.78	*
73	18	5	22	0.48	
74	20	1	25	0.70	
75	23	5	35	0.67	
76	25	7	44	0.67	*
77	14	1	11	0.48	
78	36	2	20	0.52	*
79	1	0	12	0.04	
80	13	0	11	0.48	*
81	9	0	14	0.33	*
82	12	0	14	0.44	*
83	3	0	4	0.11	
84	3	0	5	0.11	
85	11	0	10	0.41	
86	22	2	41	0.74	*
87	10	0	19	0.37	*
88	22	3	40	0.70	
89	12	0	19	0.44	*
90	9	0	12	033	*
91	0	0	2	0	
92	2	0	3	0.07	
93	10	0	11	0.37	
94	9	0	14	0.33	*
95	9	0	10	0.33	*
96	7	0	9	0.26	

U - The number of correct response in the upper group; L - The number of correct response in the lower group;
DI - Difficulty Index; FV - Facility Value; DP - Discriminating Power

The investigator decided to select items having reasonable difficulty index/facility value and satisfactory discriminating power. Items having difficulty index between 0.4 and 0.6 (in the case of Short answer type and Paragraph type items, facility value can be calculated instead of difficulty index and items having facility value in between 40% and 60% can be selected) are considered to be average difficulty. Items having discriminating power greater than 0.4 are considered to be having satisfactory discriminating power. Items having such properties were readily selected. For getting sufficient number of items, the investigator made some adjustments in these limits. Objective type items having the difficulty index in between 0.20 and 0.63 with discriminating power 0.3 and above were selected. Short answer type items having the facility value in between 12% and 52% with discriminating power 0.44 and above were considered for selection. Paragraph type items having the facility value in between 10% and 41% with discriminating power 0.33 and above were considered to be selected. Thus 48 items were selected for the final test. There were 30 Objective type items, nine Short answer type items and nine Paragraph type items in the final test. The time duration fixed for the test was 90 minutes and the maximum score was 93.

Validity of the Test

To estimate the validity of the Achievement test, criterion related technique was used. The final test was administered on a representative sample of 100 students in two class divisions of standard VII in a school other than the Experimental and Control subjects were selected. The response sheets were collected and scored. The second term examination marks in the same subject (Malayalam Language) of the same sample also were collected.

Then the Pearson's Product Moment correlation coefficient of the two sets of scores was calculated to find out the validity of the Achievement test. The coefficient of correlation was found to be 0.922. It indicates that the test is a highly valid tool to measure the Achievement in Malayalam Language.

Content Validity

This form of validity is estimated by evaluating the relevance of the test item individually and as a whole (Freeman, 1976). Content validity is most appropriately applied only to tests of proficiency and educational achievement. This type of test is designed to measure how well the individual has mastered a specific skill or course of the study. The investigator subjected the test items for experts' evaluation. As per this evaluation, the test content covers the significant concepts and comprehensive enough in terms of the instructional objectives. Thus the ***content validity*** of the Achievement Test in Malayalam Language was established.

Face Validity

To establish face validity items of the Achievement test was subjected to experts' evaluation. The experts confirmed that the items were able to measure Achievement in Malayalam Language of standard VII pupils.

Reliability of the Test

Reliability of the Achievement test was established using test-retest method. The test was again administered on the same sample from whom the data obtained for validation, after a period of three weeks. Thus two sets of scores were obtained, the original test scores and the retest scores. Then the correlation coefficient of the two sets of scores was calculated using the

Pearson's Product Moment formula. The coefficient of correlation was found to be 0.945. It shows that the test is a reliable one.

The coefficients of ***validity*** and ***reliability*** indicate that the test satisfied acceptable psychometric properties to measure the Achievement in Malayalam Language of standard VII pupils. A copy of the final test is given in Appendix X.

3.4.4.6. General Data Sheet for Assessing Socio-Economic Status (SES)

To assess the Socio-Economic Status of the subjects in the Experimental and Control groups, this General Data Sheet was used. Inorder to collect the information regarding ***Income, Education*** and ***Occupation*** of parents, nine columns each for father and mother are included in the general Data Sheet.

The sub-divisions and weightages of each category are as follows.

Income level of Parents	***Weightage***
Rs. 1000	5
Between 1001 - 2000	10
Between 2001 - 3000	15
Between 3001 - 4000	20
Between 4001 - 5000	25
Above 5000	30
Parental Education	
Not receive formal schooling	5
Standard I - IV	10
Standard V - VII	15
Standard VIII - X	20
PDC, TTC	25
BA/BSc./B.Com.	30

MBBS/MEd./BSc. (Engg.)/ M.A./M.Sc./MBA/ Ph.D./CA etc.	33
Parental Occupation	
Unemployed	5
Unskilled	10
Semiskilled	15
Skilled	20
Semi professional	25
Professional	30
Highly professional	35

A copy of the General Data Sheet in Malayalam and its English version are presented in Appendix XI and Appendix XII respectively.

3.4.4.7. Classroom Interaction Rating Scale (CIRS)

The investigator prepared a Rating Scale through which the Classroom Interaction under Cooperative Learning situation and Conventional Learning situation could be measured. Three categories of items are there in the Rating Scale. They are ***Inter-group Interaction, Intra-group Interaction*** and ***Student-teacher Interaction.*** For each item, the observers have to select the appropriate alternative among the three (***Always, Occasionally*** and ***Never***).

The weightage given to each alternative is as follows:

Always	3
Occasionally	2
Never	1

The weightages given are reversed for negative items.

A copy of the Interaction Rating Scale is presented in Appendix XIII.

3.4.5. EXECUTION OF THE EXPERIMENT

As a first step of the experimentation, the investigator contacted with the Heads of the schools which selected for the Experimental and Control treatments and fixed a schedule. The experiment was executed according to the following pattern.

3.4.5.1. Administration of the Pretest

Before starting the treatment, both the Experimental and Control groups were given the same Achievement Test in Malayalam Language as the Pretest and the response sheets were collected. This was done with a view to measure the Pre-experimental Status of the pupils (of both the groups) with regard to the Achievement in Malayalam Language.

3.4.5.2. Experimental Treatment

Before starting the Experimental treatment the seating arrangement of the classroom was changed from the Conventional type to the ***horse-shoe*** format. This arrangement ensured better Inter-group, Intra-group, and Teacher-student interaction.

The investigator started the Experimental treatment with the prose lesson ***Eenathil Thalathil*** using Cooperative Learning Strategy (Jigsaw-II Model). Then the poem, ***Pootha Mavineppatti*** was taught. Thus all the selected units (six prose lessons and three poems) were taught through Jigsaw-II Model of Cooperative Learning Strategy. Language exercises (grammar and structure) included in these units were also taught. Thus nine units (each consisting of three sub-units) were taught using 27 periods (one period each for one sub-unit). The time duration of a period was 90 minutes.

Thus, a total time duration of 40 hours and 30 minutes was utilized for the Experimental treatment. The investigator took care to ensure that, the classroom activities were going through the four phases (Base group formation, Expert group formation, Peer tutoring and Rewarding the winning group) described in the Lesson Transcripts for Cooperative Learning Strategy.

3.4.5.3. Control Treatment

For treatment in the Control group, the nature of the classroom was not altered. The ***Conventional lecture Method*** was used to teach the topics selected. Only Conventional teaching aids were used. The topics selected were the same for the Experimental and the Control groups. The 27 sub-units (nine units, each consisted of three sub-units) were taught using 54 periods. The time duration of a period was 45 minutes. Thus the total time duration for the Control treatment was kept equal to that of the Experimental treatment (40 hours and 30 minutes).

3.4.5.4. Administration of the Post test-I

The Post test data were collected from the subjects in both the Experimental and Control groups the next day after the completion of the treatments. This was done to measure the post-treatment status of the subjects in terms of Achievement in Malayalam Language. The Achievement Test in Malayalam Language prepared by Kumar and Sasidharan (2001) which was already used as the Pretest, was utilized for this purpose. All necessary guidelines were given to the subjects, before administering the test. And the purpose of the test was made clear to them. The time duration of the Post test was 90 minutes.

3.4.5.5. Data on Other Variables

During the treatment period, the data on the other Independent Variable, Classroom Environment, on the Control Variables, viz., Verbal Intelligence and Non-verbal Intelligence and on the Basal Variable, Socio-Economic Status were collected from both the Experimental and Control groups. Classroom Environment Inventory was administered during the first week of the treatment. In the second week, the Verbal Group Test of Intelligence was administered. Non-verbal Intelligence Test was given during the third week of the treatment. The General Data Sheet was also given to the subjects with a view to quantify the Socio-Economic Status. Besides, an observation schedule was utilized to collect data on Classroom Interaction under both Cooperative and Conventional classroom set up.

3.4.5.6. Administration of the Post test-II

The same Achievement test (which was already used as the Pretest and the Post test-I) was administered again in the Experimental and Control groups after one month of the completion of the treatment (Post test-II). This was done to measure the quantity of Retention in Malayalam Language existing one month after the completion of the treatment.

3.4.5.7. Scoring and Consolidation of Data

Specific directions given in the respective test manuals were followed for scoring the response sheets. Answer scripts of Achievement Test in Malayalam Language were scored on the basis of the scoring key and the prefixed value points. In the case of Classroom Environment Inventory, the positive items (Yes-response) only were scored with one score each. Punched scoring keys were used for the Verbal and Non-verbal Intelligence Tests.

Socio-Economic Status was quantified by giving appropriate weightages assigned to each aspect in the General Data Sheet. Classroom Interaction Rating Scale was scored giving appropriate weightage to each response. Response sheets which completed in all respects were only taken into consideration. Thus the final sample of 100 pupils of standard VII was obtained. After scoring the response sheets, the scores were tabulated separately for the Experimental and Control groups. Actual number of the subjects included in the final sample is given as follows.

Sample	Experimental Group	Control Group	Total
Boys	20	31	51
Girls	30	19	49
Total	50	50	100

3.4.6. STATISTICAL TECHNIQUES USED FOR ANALYSIS

The present study demanded the use of the following statistical techniques.

3.4.6.1. Mean Difference Analysis

Test of Significance of Difference between Means was used to compare the relevant variables between the Experimental and Control groups. This statistical technique was mainly employed to study whether the Experimental and Control groups differ in Achievement, Gain and Retention scores without controlling the effects of the Covariates. Mean Difference Analysis was also employed to equate the Experimental and Control groups with regard to Pre-experimental Status (Pretest score), Verbal and Non-verbal Intelligence and

Socio-Economic Status of the pupils. To compare the nature of interaction in the Cooperative and Conventional Classrooms, this technique was resorted. For the large sample, the following formula suggested by Garrett (1981) was used.

$$t = \frac{M_1 - M_2}{\sqrt{\left[\frac{\sigma^2_1}{N_1} + \frac{\sigma^2_2}{N_2}\right]}}$$

Here, M_1, M_2 are the means, σ_1, σ_2 are the standard deviations, and N_1, N_2 are sample size of the groups.

For the small sample, the following formulae suggested by Garrett (1981) were used.

$$t = \frac{(M_1 - M_2) - 0}{SE_D}$$

$$SE_D = SD \sqrt{\frac{N_1 + N_2}{N_1 \; N_2}}$$

$$SD = \sqrt{\frac{\Sigma (X_1 - M_1)^2 + \Sigma (X_2 - M_2)^2}{(N_1 - 1) + (N_2 - 1)}}$$

In these formulae, M_1, M_2 are the means, N_1, N_2 are the sample size of the groups, X_1, X_2 are the scores of the groups, SE_D is the standard error and SD is the standard deviation.

3.4.6.2. Analysis of Covariance (ANCOVA)

In the present study, Two Factor ANCOVA employing three Covariates viz., Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence (singly and in combination of the three at a time) was used to confirm the effectiveness of Cooperative Learning Strategy (Jigsaw-II Model) over the Conventional lecture Method of Teaching, if any. Through Analysis of Covariance the investigator can control or adjust the effects of one or more uncontrolled variables and thereby permit a valued evaluation of the outcome of the experiment. It is applied when there are one or more correlated variables existing with the Dependent Variable. It can control the effects of any of the Covariates on the Dependent Variables using ANCOVA.

An application of a simple Analysis of Covariance requires paired observations on 'k' groups of the experimental subjects. The number of pairs of observations in the 'k' groups is denoted by N_1, N_2 . . . N_k. The paired observations are assumed to be paired samples drawn from 'k' populations. The data may be represented as follows in Table 3.9 (Ferguson & Takane, 1989).

TABLE 3.9

Representation of Data for ANCOVA

Group 1	Group 2	Group k
$Y_{11}\ X_{11}$	$Y_{12}\ X_{12}$	$Y_{1k}\ X_{1k}$
$Y_{21}\ X_{21}$	$Y_{22}\ X_{22}$	$Y_{2k}\ X_{2k}$
$Y_{31}\ X_{31}$	$Y_{32}\ X_{32}$	$Y_{3k}\ X_{3k}$
....	.....	.....
$Y_{N1'}\ X_{N1'}$	$Y_{N2^2}\ X_{N2^2}$	$Y_{Nk^k}\ X_{Nk^k}$
Mean $\bar{Y}_1\ \bar{X}_1$	$\bar{Y}_2\ \bar{X}_2$	$\bar{Y}_k\ \bar{X}_k$

In this notation X is the variable under study, the Dependent Variable, whereas Y is the uncontrolled variable, or Covariate. In the Analysis of Covariance, sums of products for the observations in the j^{th} group is denoted by

$$\sum_{i=1}^{Nj} (Xij - \bar{X}j)\ (Yij - \bar{Y}j)$$

The sum of products for all observations in the 'k' groups, that is the total sum of products is

$$\sum_{j=1}^{k} \sum_{i=1}^{Nj} (Xij - \bar{X})\ (Yij - \bar{Y})$$

The computation formula for the *total* sum of products is

$$\sum_{j=1}^{k} \sum_{i=1}^{Nj} (Xij - \bar{X})\ (Yij - \bar{Y}) = T_{XY} - \frac{T_X\ T_Y}{N}$$

The *within-groups* sums of products may be obtained by

$$\sum_{j=1}^{k} \sum_{i=1}^{Nj} (Xij - \bar{X}j)(Yij - \bar{Y}j) = T_{XY} - \sum_{j=1}^{k} \frac{T_{XJ}\, T_{YJ}}{Nj}$$

The *between-groups* sums of products is

$$\sum_{j=1}^{k} Nj\, (\bar{X}j - \bar{X})(\bar{Y}j - \bar{Y}) = \sum_{j=1}^{k} \frac{T_{XJ}\, T_{YJ}}{Nj} - \frac{T_X\, T_Y}{N}$$

These formulae are applicable to groups of unequal or equal size.

The calculation of the required sums of squares may be simplified by the use of computation formulae. The formula for the *total* sum of squares is

$$\sum_{j=1}^{k} \sum_{i=1}^{Nj} (X_{ij} - \bar{X})^2 = \sum_{j=1}^{k} \sum_{i=1}^{Nj} X_{ij}^2 - T^2/N$$

The *within-groups* sum of squares is

$$\sum_{j=1}^{k} \sum_{i=1}^{Nj} (X_{ij} - \bar{X}j)^2 = \sum_{j=1}^{k} \sum_{i=1}^{Nj} X_{ij}^2 - \sum_{j=1}^{k} (T_j^2/Nj)$$

The *between-groups* sum of squares is

$$\sum_{j=1}^{k} Nj\, (\bar{X}j - \bar{X})^2 = \sum_{j=1}^{k} (T^2_j / Nj) - T^2/N$$

The above formulae are generally applicable to groups of unequal or equal size.

To assist in the interpretation of the results, the adjusted group means are calculated. This computation requires the pooled within class regression coefficients.

$$bw = E_{XY} / E_{XX}$$

The adjusted group means are calculated using the following formulae.

The adjusted group mean for the Experimental group is

$$Y_{1(adj)} = \overline{Y}_1 - b_w (\overline{X}_1 - \overline{X})$$

The adjusted group mean for the Control group is

$$Y_{2(adj)} = \overline{Y}_2 - b_w (\overline{X}_2 - \overline{X})$$

In the present context, Analysis of Covariance employing two Independent Variables involving Two-way classification is the Two-Factor ANCOVA. The Independent Variables are Instructional Learning Strategies and Classroom Environment. Two levels of Instructional Learning Strategies are Cooperative Learning Strategy (CLS) and Conventional lecture Method of Teaching (CMT). Two levels of Classroom Environment are Above Average Classroom Environment (AACE) and Below Average Classroom Environment (BACE).

3.4.6.3. Two-way ANOVA with 2 x 2 Factorial Design

Two-way ANOVA with 2 x 2 Factorial design was used to study the ***main*** and ***interaction*** effects of the Independent Variables on the Dependent Variables. Analysis of Variance employing two Independent Variables

involving Two-way classification is the Two-way ANOVA. By this method the investigator could study the single effect of each of the Independent Variables on the Dependent Variables and the ***first order interaction*** effect of the Independent Variables.

Interaction in the Two-way Analysis of Variance

In a Two-way classification with ***n*** observation per cell, the total sum of squares is divided into four additive components, a ***between rows,*** a ***between columns, an interaction*** and a ***within cells.*** Each sum of squares has an associated degrees of freedom to obtain variance estimate or mean squares which are used to test the significance of interaction effect.

F-ratios are formed from the variance estimate and used to test the significance of rows, columns and interaction effect. A model ANOVA (Ferguson & Takane, , 1989) is given in Table 3.10.

TABLE 3.10

Model ANOVA

Source	Sum of Squares	df	Mean Square
Rows	$nC \sum_{r=2}^{R} (\bar{X}.r\ldots - \bar{X}\ldots)^2$	R-1	Sr^2
Columns	$nR \sum_{c=1}^{C} (\bar{X}.c - \bar{X}\ldots)^2$	C-1	Sc^2
Interaction	$n \sum_{r=1}^{R} \sum_{c=1}^{C} (\bar{X}.rc. - \bar{X}r.- \bar{X}c. + \bar{X}\ldots)^2$	(R-1) (C-1)	Src^2
Within cells	$\sum_{r=1}^{R} \sum_{c=1}^{C} \sum_{i=1}^{n} (X.irc - \bar{X}rc)^2$	RC (n-1)	S^2rc
Total	$\sum_{r=1}^{R} \sum_{c=1}^{C} \sum_{i=1}^{n} (Xirc - \bar{X}\ldots)^2$	nRC-1	

R - Number of rows
C - Number of columns
n - Number of measurement in each cell : n>1
N - nRC (Total number of measurement)
X - Mean of all nRC observations
df - Degrees of freedom.

2x2 ANOVA was used for the present study because, two levels of two Independent Variables [Instructional Learning Strategies into Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT and Classroom Environment into Above Average Classroom Environment - AACE and Below Average Classroom Environment - BACE] were

incorporated in the experiment. Thus in the ANOVA process, the Total sample was classified into four cells. These four cells are as follows:

1. Experimental group (in which Cooperative Learning Strategy was used) with AACE.
2. Experimental group with BACE.
3. Control group (in which Conventional lecture Method of Teaching was used) with AACE.
4. Control group with BACE.

Each of the Total sample would fall into one of these cells. The same classification was adopted for ANOVA for Achievement and ANOVA for Retention.

3.4.6.4. Scheffé Test of Post-hoc Comparison

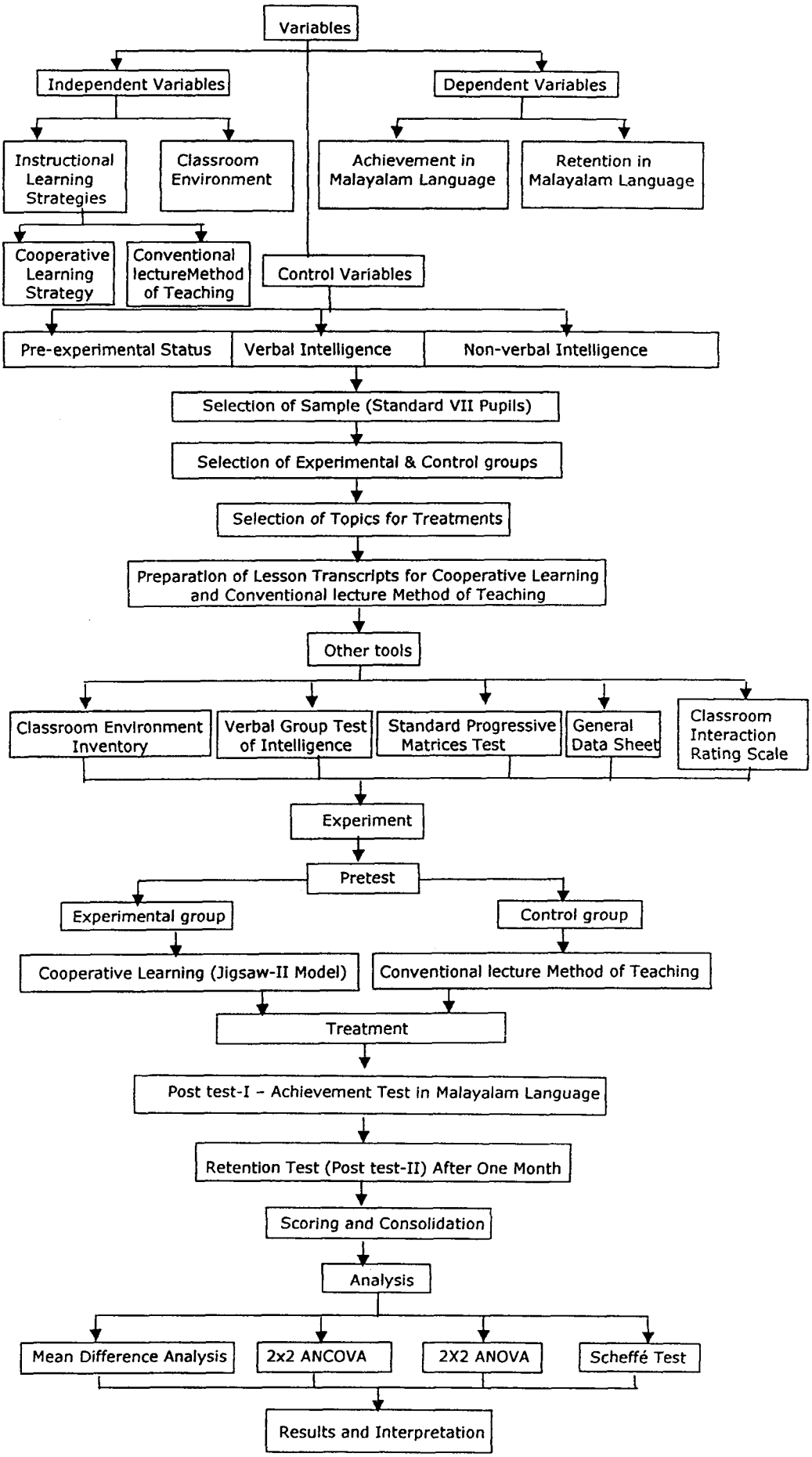
After ANCOVA, Scheffé (1959) Test was used as a technique of Post-hoc Comparison of the adjusted criterion means of the Experimental and Control groups to determine the group difference. Two-way ANOVA was also followed by Scheffé Test of Post-hoc Comparison to estimate the group difference based on criterion means.

The F-ratios between pairs of means are calculated using the within group variance. The values of F are compared with the values of F' at 0.05 level and 0.01 level. A significant difference between the pairs of means is judged at the required levels only when the value of F-is ***equal*** to or ***greater*** than F' (Ferguson, 1976).

3.5. SUMMARY OF PROCEDURE

The entire procedure adopted in the present research programme is summarised and presented in the following flow chart.

Flow chart Showing the Summary of Procedure



Chapter 4

ANALYSIS

- **Preliminary Analysis**
  - Important Statistical Properties
  - Establishing the Equivalence of the Groups
  - Investigation of Classroom Interaction
- **Major Analysis**
  - Mean Difference Analysis
  - Analysis of Covariance for Achievement and Retention
  - Analysis of Variance for Achievement and Retention

4 ANALYSIS

To examine the effectiveness of ***Instructional Learning Strategies*** (Cooperative Learning Strategy - Jigsaw II Model and Conventional lecture Method of Teaching) ***on Achievement and Retention*** in Malayalam Language of standard VII pupils, the investigator analysed the collected data. The analysis was carried on also to study the influence of ***Instructional Learning Strategies*** (Cooperative Learning - Jigsaw II Model and Conventional lecture Method) and ***Classroom Environment*** on ***Achievement*** and ***Retention*** in Malayalam Language of the sample. For analysis relevant statistical techniques such as ***Test of Significance of Difference between Means*** for Large and Small Independent Samples wherever necessary, ***Two Factor ANCOVA*** employing three Covariates (separately and in combination of the three at a time), ***Two-way ANOVA*** with 2 x 2 Factorial Design and ***Scheffe' Test*** of Post-hoc Comparison were employed. The statistical analysis of the data was done to throw light on the major and specific objectives set for the study.

Analysis of the data was done using the software, SPSS (Statistical Package for Social Sciences - Hull & Nie, 1981). The whole analysis done for the present study is described in the following order.

4.1 PRELIMINARY ANALYSIS

In the present study, a preliminary analysis was done as a first step, to find out the important statistical properties of the variables and to examine the ***equivalance*** of the Experimental and Control groups (Total sample, Boys and Girls) in terms of the mean scores of relevant variables [***Pre-experimental Status*** (Pretest score), ***Verbal Intelligence, Non-verbal Intelligence*** and ***Socio Economic Status***]. Investigation of classroom interaction under Cooperative Learning condition and Conventional Classroom condition also was included in the preliminary analysis. The preliminary analysis done is presented in the following sub-sections.

4.1.1. IMPORTANT STATISTICAL PROPERTIES

The important statistical properties such as mean, median, mode standard deviation, skewness and kurtosis were computed for the scores on the Pretest, Achievement (Objectivewise and Total score), Gain, Retention

(Objectivewise and Total score), Verbal Intelligence, Non-verbal Intelligence, Classroom Environment and Socio-Economic Status of the pupils. These values were calculated separately for the Experimental and Control groups (Total sample, Boys and Girls). These are presented in Tables 4.1 and 4.2 respectively.

TABLE 4.1

Important Statistical Properties of the Variables for the Experimental Group (Total sample, Boys and Girls)

Sl. No.	Variable	Total sample N = 50						Boys N = 20						Girls N = 30					
		Mean	Median	Mode	S.D	Skew-ness	Kur-tosis	Mean	Median	Mode	S.D	Skew-ness	Kur-tosis	Mean	Median	Mode	S.D	Skew-ness	Kur-tosis
1.	Pretest	9.72	9.00	10.00	6.869	1.802	6.486	9.55	8.00	0.00	9.035	2.128	6.242	9.833	10.00	10.00	5.12	0.32	-0.288
2.	Knowledge	9.28	9.00	8.00	3.764	0.01	0.43	9.20	8.50	5.00	5.347	0.12	-0.986	9.333	9.50	10.00	2.279	-0.573	0.960
3.	Comprehension	6.82	8.00	9.00	4.134	0.253	-0.381	6.45	5.50	1.00	5.306	0.50	-0.771	7.067	8.00	9.00	3.205	-0.071	-0.671
4.	Application	7.74	8.00	8.00	3.853	0.253	-0.541	7.25	7.00	2.00	4.789	0.423	-1.056	8.067	8.00	8.00	3.129	0.303	0.065
5.	Analysis	6.56	6.00	6.00	3.77	0.484	-0.458	5.85	5.00	2.00	4.234	0.953	0.221	7.033	6.00	6.00	3.419	0.214	-0.604
6.	Synthesis	2.14	2.00	2.00	1.355	0.607	0.447	1.90	2.00	1.00	1.483	0.404	-0.666	2.30	2.00	2.00	1.264	1.035	1.721
7.	Evaluation	1.82	1.00	1.00	1.637	1.057	0.428	1.80	1.00	0.00	1.908	1.125	0.471	1.833	1.50	1.00	1.464	1.015	0.337
8.	**Achievement (Total)**	34.36	37.00	37.00	16.218	0.242	0.162	32.45	32.50	41.00	21.649	0.538	-0.505	35.633	37.00	37.00	11.538	-0.202	-0.092
9.	Gain score	24.64	26.50	30.00	11.579	0.017	-0.482	22.90	23.00	5.00	14.782	0.303	-1.132	25.80	26.50	30.00	8.938	-0.095	0.331
10.	Knowledge	9.00	9.00	7.00	3.943	0.141	-0.355	8.65	9.00	2.00	5.224	0.13	-1.338	9.233	9.00	7.00	2.873	0.731	0.773
11.	Comprehension	5.78	5.00	5.00	3.976	0.880	1.186	5.65	5.00	1.00	4.815	1.091	1.578	5.867	5.00	5.00	3.391	0.572	-0.078
12.	Application	7.80	8.00	8.00	3.995	-0.027	-0.795	6.75	7.50	8.00	4.351	0.227	-0.395	8.50	9.00	10.00	3.646	-0.048	-1.215
13.	Analysis	5.54	5.00	1.00	3.704	0.323	-0.787	4.05	3.00	1.00	3.762	1.018	0.855	6.533	7.00	3.00	3.371	0.099	-1.066
14.	Synthesis	1.70	2.00	1.00	1.233	1.286	2.619	1.55	1.00	1.00	1.432	1.741	4.234	1.80	2.00	1.00	1.095	0.931	1.438
15.	Evaluation	1.36	1.00	1.00	1.120	0.683	0.00	1.20	1.00	0.00	1.399	0.886	-0.452	1.467	1.00	1.00	0.90	0.716	1.042
16.	**Retention (Total)**	31.18	31.00	24.00	16.175	0.306	-0.029	27.85	28.5	7.00	19.76	0.703	0.207	33.40	35.00	24.00	13.172	0.149	-0.532
17.	Verbal Intelligence	36.66	35.00	33.00	13.183	1.092	1.639	38.60	34.50	33.00	14.802	1.412	2.352	35.367	35.00	18.00	12.073	0.661	0.316
18.	Non-verbal Intelligence	27.94	31.00	35.00	11.821	-0.088	-1.021	29.15	30.50	5.00	13.22	-0.026	-0.916	27.133	31.00	35.00	10.95	-0.266	-1.386
19.	Classroom Environment	40.64	41.00	40.00	4.265	-0.414	0.304	40.05	40.5	40.00	3.441	-0.943	1.034	41.033	42.00	39.00	4.752	-0.423	0.040
20.	Socio-Economic Status	71.12	60.00	60.00	30.38	2.31	5.523	73.65	62.50	55.00	35.654	1.912	2.933	69.433	60.00	60.00	26.82	2.848	10.669

TABLE 4.2

Important Statistical Properties of the Variables for the Control Group (Total sample, Boys and Girls)

Sl. No.	Variable	Total ample N = 50						Boys N = 31						Girls N = 19					
		Mean	Median	Mode	S.D	Skew-ness	Kur-tosis	Mean	Median	Mode	S.D	Skew-ness	Kur-tosis	Mean	Median	Mode	S.D	Skew-ness	Kur-tosis
1.	Pretest	8.56	8.00	6.00	4.385	0.661	0.756	8.065	7.00	5.00	4.524	0.398	0.005	9.368	8.00	6.00	4.139	1.53	2.598
2.	Knowledge	5.40	5.00	2.00	3.326	0.594	-0.278	5.194	5.00	2.00	3.40	0.687	-0.120	5.737	6.00	2.00	3.263	0.519	-0.182
3.	Comprehension	5.12	4.00	3.00	3.612	0.749	0.327	5.065	4.00	1.00	4.082	0.890	0.253	5.211	5.00	9.00	2.78	0.017	-1.062
4.	Application	4.82	4.50	3.00	3.293	0.716	0.347	4.226	3.00	1.00	3.461	1.034	0.857	5.789	6.00	7.00	2.82	0.589	1.031
5.	Analysis	5.32	5.00	1.00	3.83	0.366	-0.945	4.516	4.00	1.00	3.855	0.761	-0.543	6.632	7.00	7.00	3.499	-0.108	-0.391
6.	Synthesis	1.30	1.00	1.00	1.313	1.104	0.514	1.161	1.00	0.00	1.293	1.063	0.188	1.526	1.00	1.00	1.349	1.305	1.345
7.	Evaluation	1.16	1.00	0.00	1.167	1.041	1.236	1.00	1.00	0.00	1.211	1.444	2.506	1.421	1.00	2.00	1.071	0.532	0.428
8.	**Achievement (Total)**	23.12	21.50	9.00	14.362	0.438	-0.734	21.161	19.00	9.00	15.533	0.749	-0.412	26.316	29.00	31.00	11.917	-0.004	-1.020
9.	Gain score	14.56	15.50	18.00	11.611	0.396	-0.547	13.097	9.00	2.00	12.579	0.836	0.022	16.947	21.00	5.00	9.675	-0.614	-1.211
10.	Knowledge	5.18	4.50	3.00	3.274	0.567	-0.522	4.968	4.00	3.00	3.507	0.609	-0.716	5.526	5.00	6.00	2.913	0.693	0.365
11.	Comprehension	4.08	4.00	5.00	2.863	0.215	-0.915	3.645	3.00	0.00	3.094	0.493	-0.766	4.789	5.00	4.00	2.347	-0.063	-1.020
12.	Application	4.54	4.00	0.00	3.581	0.554	-0.503	3.645	2.00	0.00	3.738	1.006	0.216	6.00	5.00	4.00	2.828	0.494	-0.576
13.	Analysis	4.70	5.00	0.00	3.829	0.349	-1.172	3.774	2.00	0.00	3.676	0.769	-0.600	6.211	6.00	11.00	3.675	-0.210	-0.992
14.	Synthesis	1.26	1.00	1.00	0.803	0.47	0.022	1.065	1.00	1.00	0.772	0.351	-0.068	1.579	1.00	1.00	0.769	0.937	-0.542
15.	Evaluation	0.96	1.00	0.00	0.989	0.742	-0.469	0.645	0.00	0.00	0.915	1.355	1.031	1.474	1.00	1.00	0.905	0.339	-0.499
16.	**Retention (Total)**	20.72	22.00	8.00	13.085	0.202	-1.089	17.742	14.00	3.00	13.743	0.632	-0.746	25.579	26.00	8.00	10.543	-0.245	-0.711
17.	Verbal Intelligence	35.44	36.00	36.00	9.205	0.076	-0.177	35.387	36.00	26.00	9.898	0.108	-0.045	35.526	36.00	28.00	8.208	0.00	-0.736
18.	Non-verbal Intelligence	26.94	28.50	15.00	11.958	-0.036	-1.059	27.355	28.00	20.00	11.949	0.066	-1.081	26.263	29.00	27.00	12.269	-0.198	-1.056
19.	Classroom Environment	34.84	36.00	36.00	5.846	-0.559	0.466	33.839	34.00	37.00	6.251	-0.651	-0.049	36.474	36.00	36.00	4.835	0.335	0.211
20.	Socio-Economic Status	68.30	67.50	70.00	15.766	2.214	10.54	68.226	70.00	70.00	12.079	-0.524	-0.150	68.421	65.00	60.00	20.82	2.974	10.846

4.1.2. ESTABLISHING THE EQUIVALENCE OF THE GROUPS

Since the experiment was conducted using the ***Pretest-Posttest Equivalent-Groups Design,*** it was very important to establish the equivalence of the Experimental and Control groups with respect to the relevant variables. As the sample for the present study was two intact classroom groups, the investigator attempted to examine the equivalence of these groups for the Total sample, Boys and Girls with regard to some select variables such as the ***Pre-experimental Status*** (Pretest score), ***Verbal Intelligence, Non-verbal Intelligence and Socio-Economic Status of the Pupils.***

In the present study equivalence of the groups was established ***statistically.*** For this purpose, Test of Significance of Difference between Means of Large and Small Independent Samples was used wherever needed. The comparison was done separately for the Total sample, Boys and Girls with regard to the scores in the four variables.

The means and standard deviations of the scores on the Pretest, Verbal Intelligence, Non-verbal Intelligence and Socio-Economic Status of relevant groups were calculated and subjected to the Mean Difference Analysis. The data and results of the t-test are presented in Table 4.3.

TABLE 4.3

Data and Results of the t-test for the Scores on the Pretest, Verbal Intelligence, Non-verbal Intelligence and Socio-Economic Status Between the Experimental and Control Groups (Total sample, Boys and Girls)

Variable	Groups Compared	Total					Boys					Girls				
		M	σ	N	t-value	Level of Significance	M	σ	N	t-value	Level of Significance	M	σ	N	t-value	Level of Significance
Pre-experimental Status (Pre-test score)	Experimental	9.72	6.869	50	1.01	NS	9.55	9.035	20	0.68	NS	9.833	5.12	30	0.35	NS
	Control	8.56	4.385	50			8.065	4.524	31			9.368	4.139	19		
Verbal Intelligence	Experimental	36.66	13.183	50	0.54	NS	38.60	14.802	20	0.86	NS	35.367	12.073	30	0.06	NS
	Control	35.44	9.205	50			35.387	9.898	31			35.526	8.208	19		
Non-verbal Intelligence	Experimental	27.94	11.821	50	0.42	NS	29.15	13.22	20	0.49	NS	27.133	10.95	30	0.25	NS
	Control	26.94	11.958	50			27.355	11.949	31			26.263	12.269	19		
Socio-Economic Status	Experimental	71.12	30.38	50	0.58	NS	73.65	35.654	20	0.66	NS	69.433	26.820	30	0.15	NS
	Control	68.30	15.766	50			68.226	12.079	31			68.421	20.82	19		

NS - Not Significant

Table 4.3 shows that, the obtained t-values for the comparison of the scores on the Pretest, Verbal Intelligence test, Non-verbal Intelligence test and General Data Sheet for Socio-Economic Status, for the Total sample, Boys and Girls are not significant even at 0.05 level. These results suggest that no significant difference occurs between the Experimental and Control groups (Total sample, Boys and Girls) in terms of these variables. Hence the Total sample, Boys and Girls of the two groups are ***identical*** or ***equivalent*** with regard to the variables used to equate the groups.

4.1.3. INVESTIGATION OF CLASSROOM INTERACTION

The investigator made an attempt to study the nature of classroom interaction under Cooperative classroom condition and Conventional classroom condition. Several studies conducted abroad have revealed that the Cooperative Learning Strategies were helpful to promote healthy interaction in the classroom (Felder, 1995; Xin, 1996; De Keyrel, *et al.*, 2000 and Ghaith, 2001). Interaction with peers leads the learner to social as well as academic development (Slavin, 1990; Jackson, 1990 and Brauer, *et al.*, 1997).

Drawing the spirit of inquiry from these findings, the investigator attempted to compare the classroom interaction under Cooperative Learning Strategy and Conventional lecture Method of Teaching.

A ***Classroom Interaction Rating Scale*** (CIRS) was prepared for this purpose. Five teachers were invited to observe the classroom activities under Cooperative Learning Strategy (Jigsaw-II) in five separate periods. Using the Rating Scale, the observers collected data on Classroom

Interaction. Another five observers collected data on Classroom Interaction from the Conventional classroom.

The data were consolidated and the means and standard deviations of each category of items were computed separately for the Cooperative classroom group and Conventional classroom group. These properties were then subjected to the Mean Difference Analysis. The percentage of score for each category was also calculated. The results of these analyses are presented in Table 4.4.

TABLE 4.4

Results of the Investigation of Interaction in the Cooperative Classroom and Conventional Classroom

Category of Interaction	Cooperative Classroom			Conventional Classroom			't' value	Level of Signi-ficance
	Percen-tage of Scores	Mean	S.D.	Percen-tage of Scores	Mean	S.D.		
Inter-group Interaction	95	22.8	0.693	58.33	14.0	1.356	11.56	0.01
Intra-group Interaction	86.67	10.4	0.748	63.33	7.6	1.131	4.13	0.01
Student-teacher Interaction	98.67	29.6	0.566	72.67	21.8	1.470	9.91	0.01

All the t-values obtained for the comparison of interaction in the Cooperative and Conventional classrooms are found significant at 0.01 level. That is, a significant difference occurs between the Cooperative and Conventional classrooms in terms of three categories of Classroom Interaction (Inter-group, Intra-group and Student-teacher interactions). Statistically significant difference between the nature of interaction in the Cooperative and Conventional classrooms is noticed. This indicates that

interaction in two classrooms is different. Higher mean scores are seen to attach with the Cooperative Classroom group. It proves that Interaction (all the three categories) is higher in the Cooperative Classroom when compared to the Conventional Classroom. Percentage of scores of each category obtained for the two groups also reveal this fact. That is, the percentage of scores are in agreement with the findings of the Mean Difference Analysis.

4.2. MAJOR ANALYSIS

In the present experimental study, three statistical techniques were employed for major analysis. They are the ***Mean Difference Analysis, Two-way Analysis of Covariance*** and ***Two-way Analysis of Variance***. Each of these techniques was used for ***complying with*** the objectives set for the Experiment. ***Mean Difference Analysis*** was employed to get an answer to the question whether the Experimental and Control groups differ in ***Achievement, Gain score*** and ***Retention*** or not, without controlling the Control Variables. ***Two-way Analysis of Covariance*** was used to examine whether the Experimental and Control groups differ in ***Achievement*** and ***Retention*** or not, after controlling the Control Variables or Covariates. Main and Interaction effects of Instructional Learning Strategies and Classroom Environment on ***Achievement*** and ***Retention*** were studied through the ***Two-Factor Analysis of Variance***. Each of the three techniques is described in detail and presented in this part of the report.

4.2.1 MEAN DIFFERENCE ANALYSIS

Difference in Achievement, Gain score and Retention, if any, between the Experimental and Control groups was investigated before controlling

the Covariates using the Mean Difference Analysis. After examining the equivalence of the Experimental and Control groups, the data were subjected to the Mean Difference Analysis. This technique was used to compare the Experimental and Control groups with regard to the Achievement (Objectivewise and Total score) Gain score and Retention (Objectivewise and Total score) without controlling the effects of the Covariates. All comparisons were done for the Total sample, Boys and Girls separately and are presented in the following sections.

4.2.1.1. Difference in Mean Achievement Scores (Objectivewise and Total score) Between the Experimental and Control Groups (Total sample, Boys and Girls)

To study whether the Experimental and Control groups differ significantly in terms of mean Achievement scores (Objectivewise and Total score), Test of Significance of Difference between Means was utilised. The comparison was done for the Total sample, Boys and Girls separately.

The means and standard deviations of the Achievement scores (Post test I - Objectivewise and Total score) were subjected to the Mean Difference Analysis. Data and results of the t-test are presented in Table 4.5.

TABLE 4.5

Data and Results of the t-test for the Mean Achievement Scores (Objectivewise and Total) Between the Experimental and Control Groups (Total sample, Boys and Girls)

Sample	Variable	Experimental Group			Control Group			t-value	Level of Signi-ficance
		M_1	σ_1	N_1	M_2	σ_2	N_2		
Total sample	Knowledge	9.28	3.764	50	5.40	3.326	50	5.46	0.01
	Comprehension	6.82	4.134	50	5.12	3.612	50	2.19	0.05
	Application	7.74	3.853	50	4.82	3.293	50	4.07	0.01
	Analysis	6.56	3.770	50	5.32	3.830	50	1.63	NS
	Synthesis	2.14	1.355	50	1.30	1.313	50	3.15	0.01
	Evaluation	1.82	1.637	50	1.16	1.167	50	2.32	0.05
	Achievement (Total)	34.36	16.218	50	23.12	14.362	50	3.67	0.01
Boys	Knowledge	9.20	5.347	20	5.19	3.400	31	2.98	0.01
	Comprehension	6.45	5.306	20	5.07	4.082	31	0.99	NS
	Application	7.25	4.789	20	4.226	3.461	31	2.44	0.05
	Analysis	5.85	4.234	20	4.516	3.855	31	1.14	NS
	Synthesis	1.90	1.483	20	1.161	1.293	31	1.82	NS
	Evaluation	1.80	1.908	20	1.00	1.211	31	1.67	NS
	Achievement (Total)	32.45	21.649	20	21.161	15.533	31	2.02	0.05
Girls	Knowledge	9.333	2.279	30	5.737	3.263	19	4.20	0.01
	Comprehension	7.067	3.205	30	5.211	2.780	19	2.14	0.05
	Application	8.067	3.129	30	5.789	2.820	19	2.64	0.01
	Analysis	7.033	3.419	30	6.632	3.499	19	0.40	NS
	Synthesis	2.300	1.264	30	1.526	1.349	19	2.00	0.05
	Evaluation	1.833	1.464	30	1.421	1.071	19	1.14	NS
	Achievement (Total)	35.633	11.538	30	26.316	11.917	19	2.70	0.01

NS - Not Significant.

Table 4.5 shows that the obtained t-values for Achievement - Total and Objectivewise scores namely Knowledge, Application and Synthesis are significant at 0.01 level and for the Objectives Comprehension and Evaluation, the t-values are found significant at 0.05 level for the Total sample.

The results indicate that the mean Achievement scores of the Experimental and Control groups (Total and Objectivewise scores except Analysis) are significantly different. Higher mean Achievement scores associated with the Experimental group show its ***advantage*** over the Control group.

The individual performance of the subjects in the Experimental and Control groups (Total sample) on the Achievement test (Post test-I - Total score) was examined graphically. The graphical representation is presented in Figure 4-1.

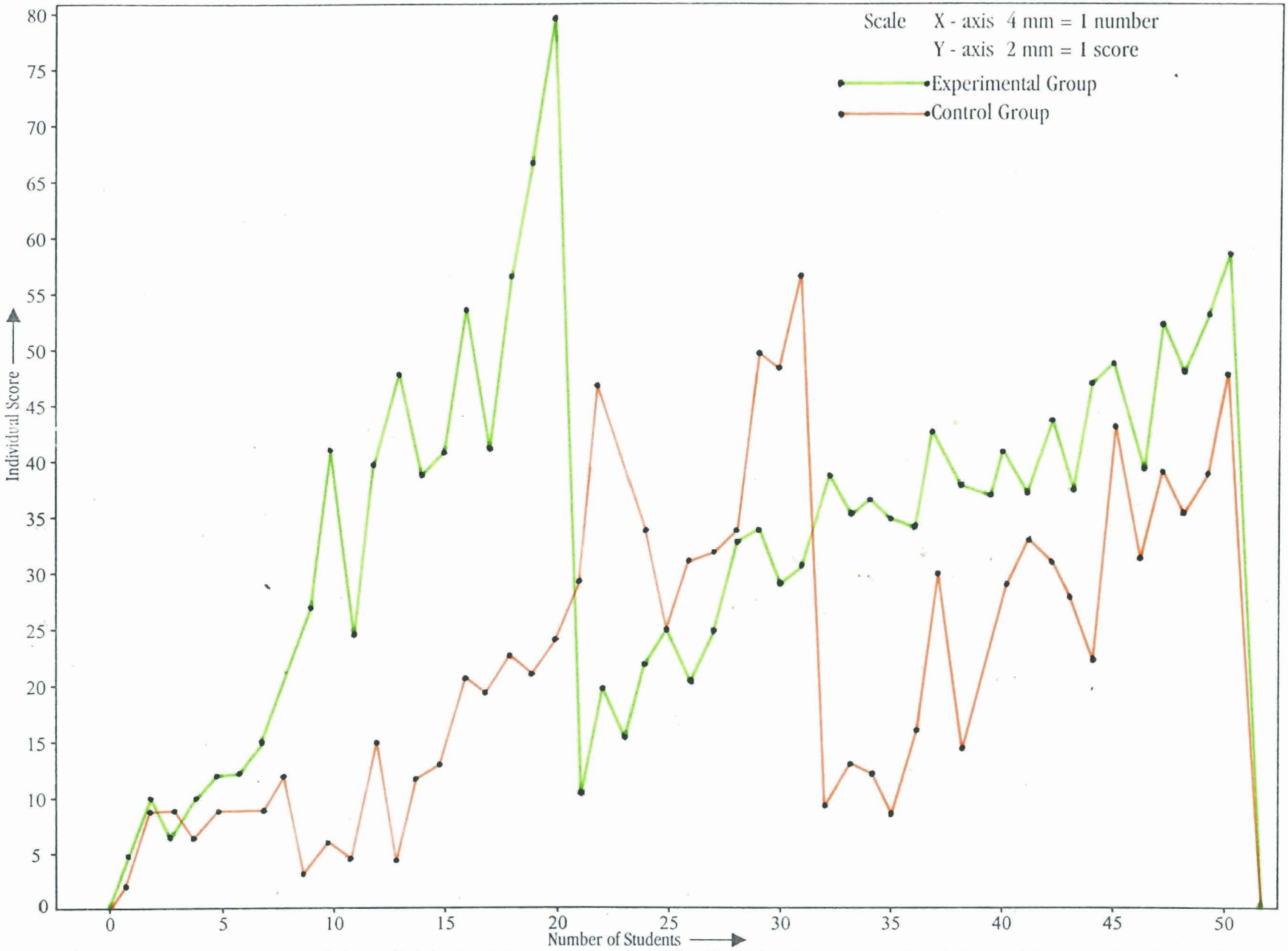


FIGURE 4 - 1 Comparison of the Individual Achievement Scores (Total) of the Experimental and Control Groups - Total sample

As per Figure 4-1, the individual performance of the subjects in the Experimental and Control groups (Total sample) on the Achievement test is ***markedly different***. This difference is statistically significant as per Table 4.5. The Experimental group shows higher individual performance than the Control group. Hence, the trend of performance of the Experimental and Control groups as shown in the graphical representation confirms the result of the t-test in the comparison of the Achievement scores (Total sample).

It can also be noted from Table 4.5 that, in the case of Boys, the obtained t-value for Achievement in Knowledge is significant at 0.01 level. The t-values obtained for Achievement - Total and for the Objective Application are found significant at 0.05 level. All other t-values for the Objectives Comprehension, Analysis, Synthesis and Evaluation are not found significant even at 0.05 level. These results indicate that there is significant difference existed in the mean Achievement scores (Total and for the Objectives, Knowledge and Application) between the Boys in the Experimental and Control groups except for the Objectives Comprehension, Analysis, Synthesis and Evaluation. Higher mean Achievement scores associated with the ***Experimental group*** (Achievement - Total and Objectivewise namely Knowledge and Application) reveal the superiority of the Experimental group over the Control group.

The individual performance of Boys in the Experimental and Control groups on the Achievement test (Post test-I - Total score) was studied graphically. The graphical representation is presented in Figure 4-2.

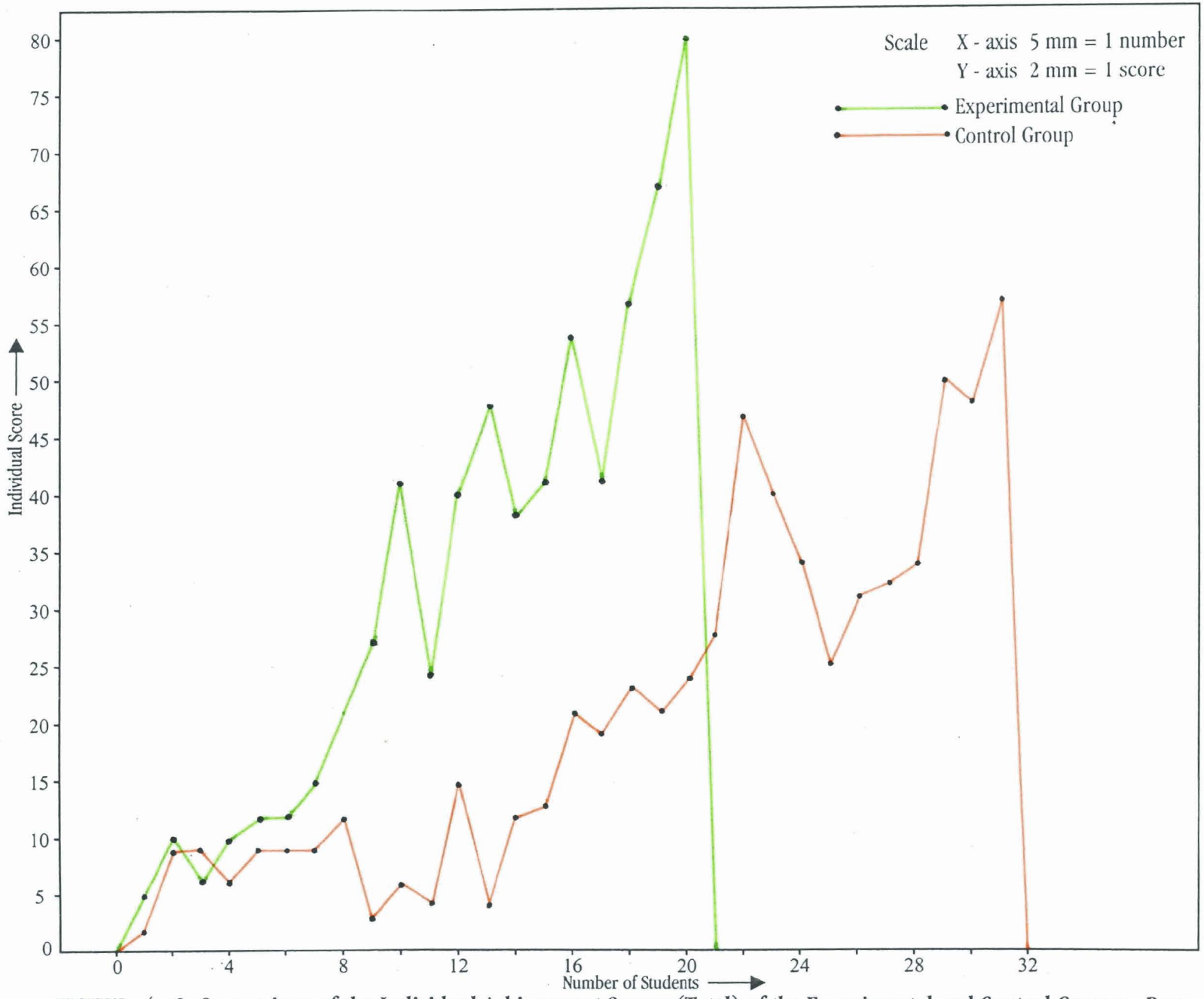


FIGURE 4 - 2 Comparison of the Individual Achievement Scores (Total) of the Experimental and Control Groups - Boys

As Figure 4-2 shows, the individual performance of Boys in the Experimental and Control groups on the Achievement test is notably different. The graph reveals higher Achievement in the case of the ***Experimental*** group. Results of the t-test indicate that, this difference is statistically significant. The graphical representation confirms the results of the comparison of Achievement scores of Boys.

In the case of Girls, it can be noted from Table 4.5 that the obtained t-values for Total and Objectivewise Achievement in Knowledge and Application are found significant at 0.01 level. For the Objectives Comprehension and Synthesis, the t-values are found significant at 0.05 level. These results indicate that the Girls in the Experimental and Control groups differ in their ***Achievement scores*** (Total and all Objectives except Analysis and Evaluation). Higher mean Achievement scores associated with Girls in the Experimental group reveal their advantage over Girls in the Control group.

Individual performance of Girls in the Experimental and Control groups on the Achievement test (Post test-I - Total score) was examined graphically and compared the pattern of performance.

The graphical representation of the comparison of the individual performance of Girls in the Experimental and Control groups is presented in Figure 4-3.

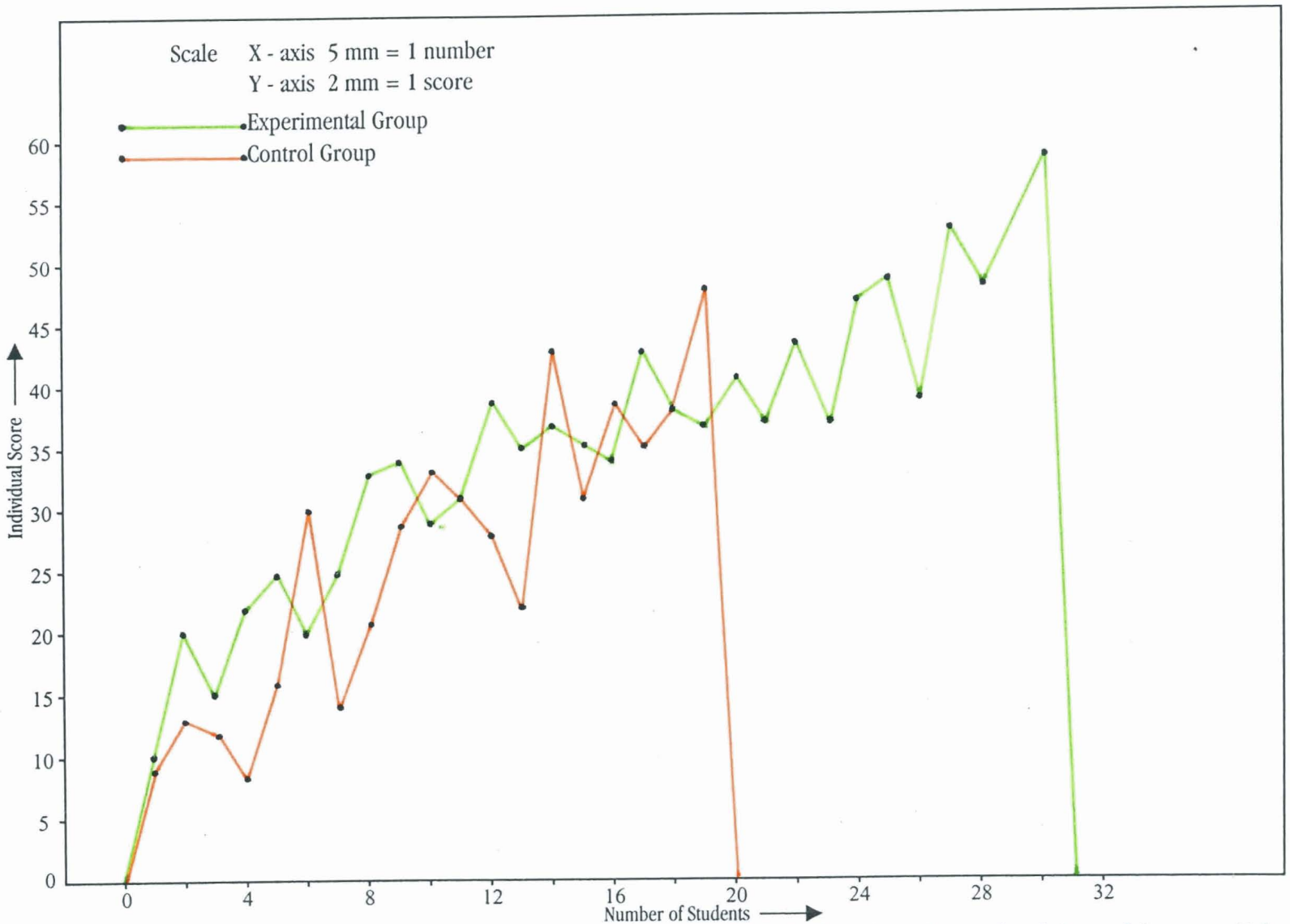


FIGURE 4 - 3 Comparison of the Individual Achievement Scores (Total) of the Experimental and Control Groups - Girls

Figure 4-3 shows that, there exists remarkable difference in the individual performance of Girls in the Experimental and Control groups on the Achievement test (Total score). The graph reveals higher performance of Girls in the Experimental group. As per the results of t-test (Table 4.5), this difference is statistically significant. Thus, the feature in the graphical representation coincides with the results of the t-test for Achievement (Total score) of Girls.

4.2.1.2. Difference in the Mean Gain Scores Between the Experimental and Control Groups (Total sample, Boys and Girls)

To study how far the Gain scores differentiate the Experimental and Control groups (Total sample, Boys and Girls), the means and standard deviations of the two groups were calculated and subjected to the Mean Difference Analysis. Data and results of the t-test are presented in Table 4.6.

TABLE 4.6

Data and Results of the t-test for the Mean Gain Scores Between the Experimental and Control Groups (Total sample, Boys and Girls)

Sl. No.	Sample	Experimental Group			Control Group			t-value	Level of Significance
		M_1	σ_1	N_1	M_2	σ_2	N_2		
1.	Total	24.64	11.579	50	14.56	11.611	50	4.35	0.01
2.	Boys	22.90	14.782	20	13.097	12.579	31	2.45	0.05
3.	Girls	25.80	8.938	30	16.947	9.675	19	3.21	0.01

It can be seen from Table 4.6 that, for the Total sample and Girls the obtained t-values are above the limit set for 0.01 level of significance. For Boys the t-value is significant at 0.05 level. These results suggest that, there is significant difference in the mean Gain scores of the Experimental and Control groups for the Total sample, Boys and Girls.

In all comparisons, the higher mean scores are seen to associate with the ***Experimental*** group. It indicates the superiority of the Experimental group (Total sample, Boys and Girls) over the Control group in the case of the Gain scores.

The individual Gain scores of the subjects in the Experimental and Control groups (Total sample, Boys and Girls) were compared graphically and studied the pattern of performance. The graphical comparison of the individual Gain scores of the subjects in the Experimental and Control groups (Total sample, Boys and Girls) are presented in Figures 4-4, 4-5 and 4-6 respectively.

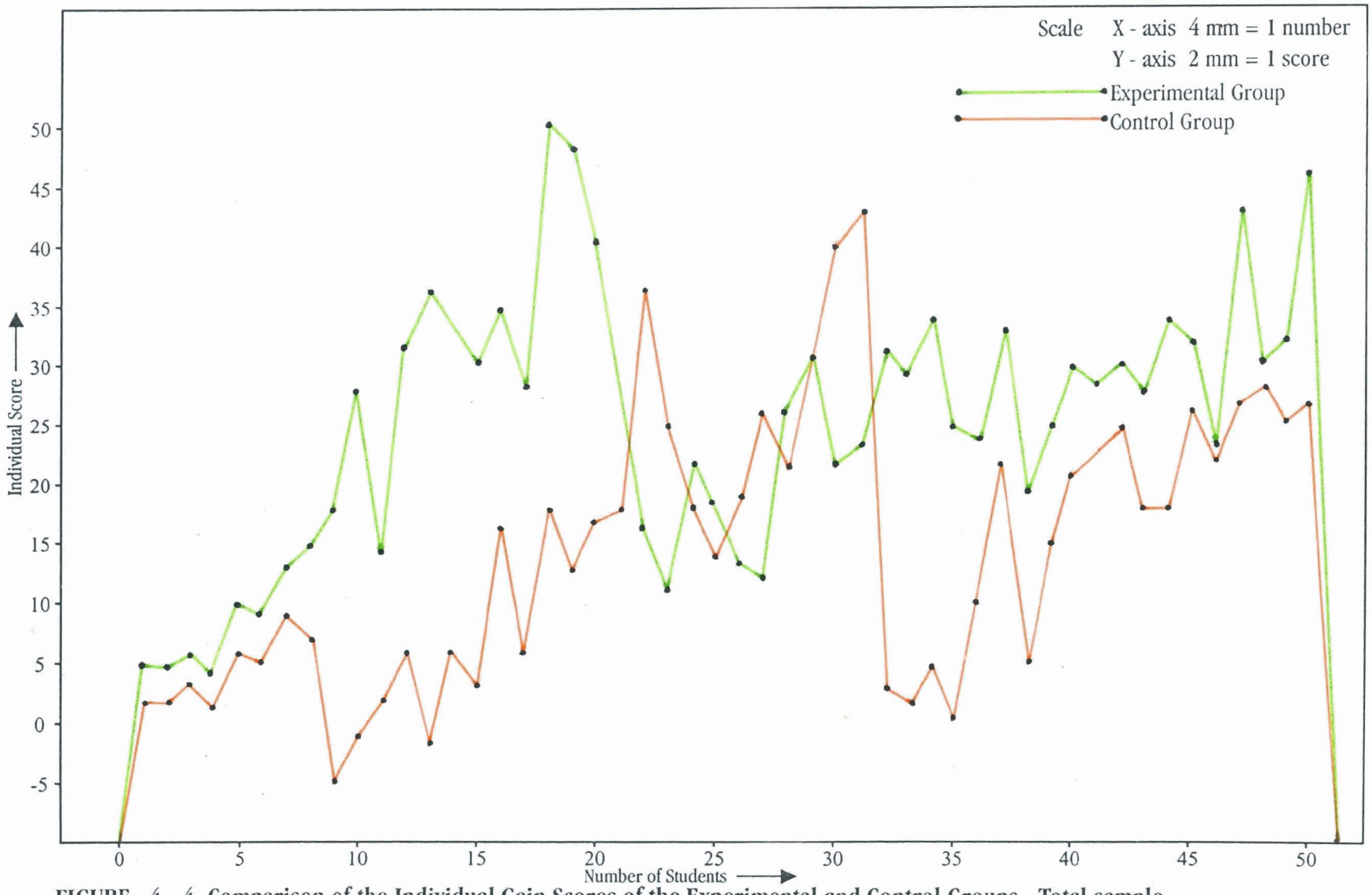


FIGURE 4 - 4 Comparison of the Individual Gain Scores of the Experimental and Control Groups - Total sample

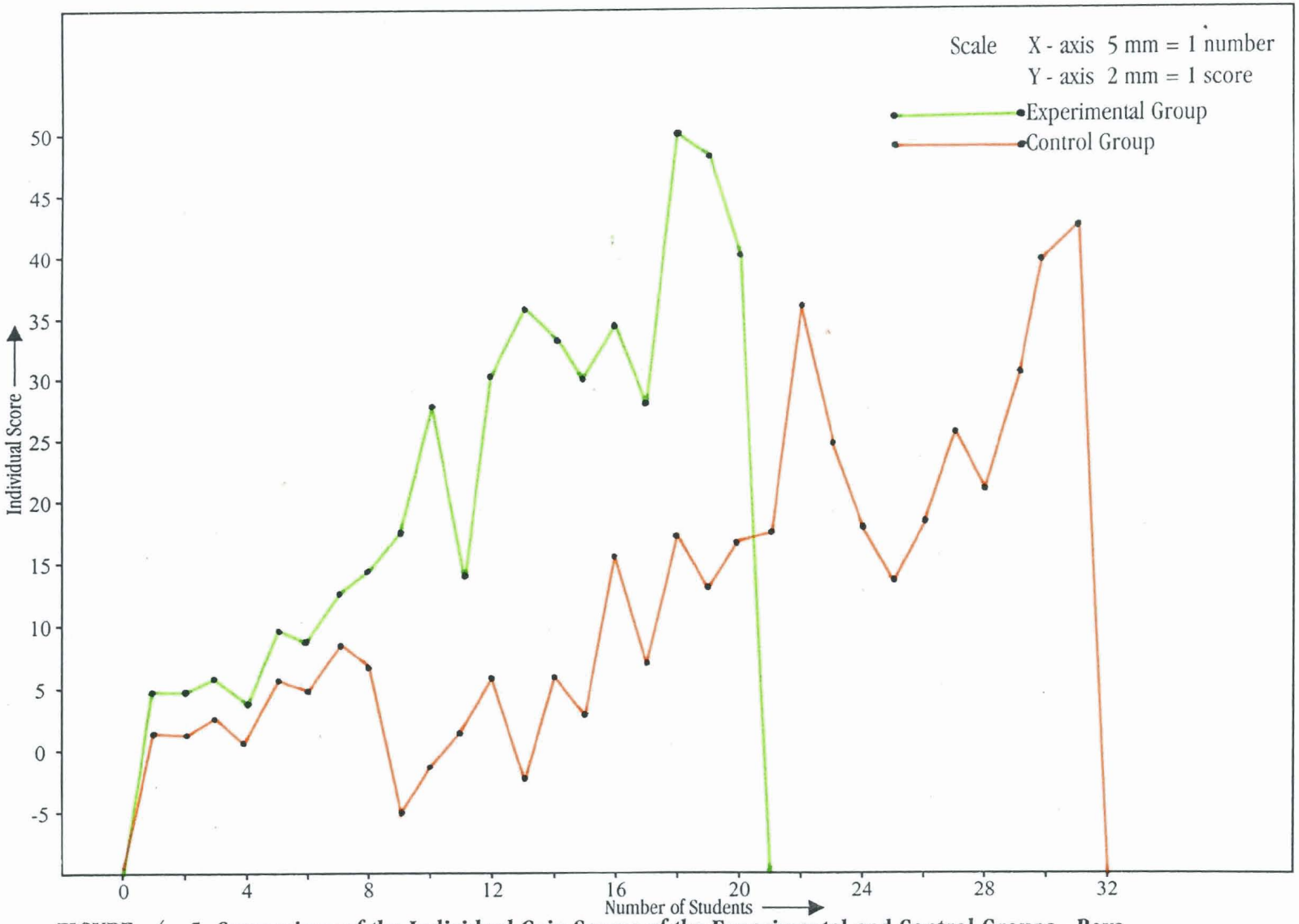


FIGURE 4 - 5 Comparison of the Individual Gain Scores of the Experimental and Control Groups - Boys

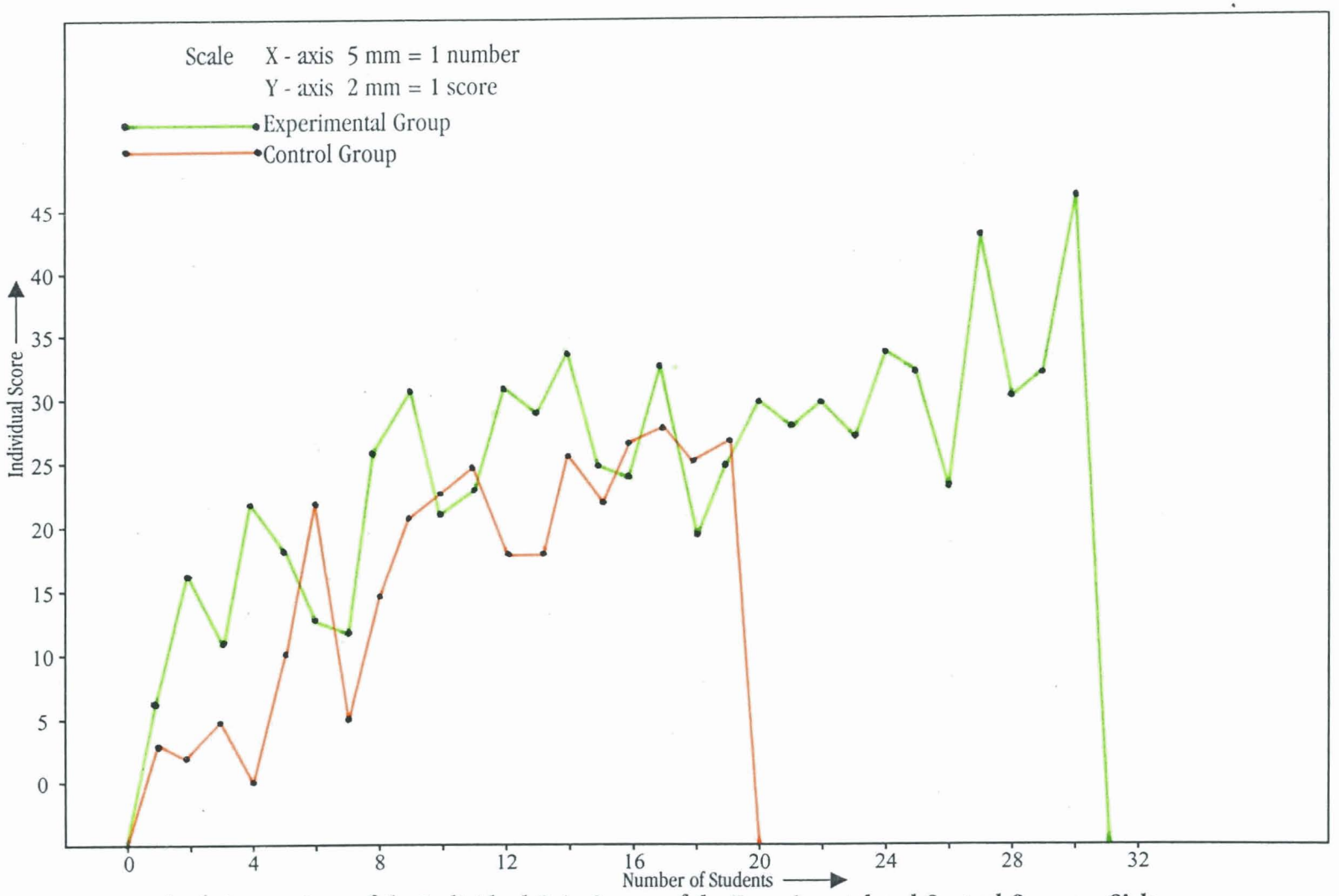


FIGURE 4 - 6 Comparison of the Individual Gain Scores of the Experimental and Control Groups - Girls

As per Figures 4-4, 4-5 and 4-6, notable difference exists between the Experimental and Control groups, with regard to the individual Gain scores of the subjects. In Total sample, Boys and Girls, the graphs reveal higher Gain scores for the ***Experimental*** group. Mean Difference Analysis (Table 4.6) of the Gain scores indicates that these differences (Total sample, Boys and Girls) are statistically significant. Patterns of individual Gain scores in the graphical representations confirm the results of the Mean Difference Analysis for the Total sample, Boys and Girls.

4.2.1.3. Difference in the Mean Retention Scores (Objectivewise and Total) Between the Experimental and Control Groups (Total sample, Boys and Girls)

To study how the Experimental and Control groups differ in terms of the mean Retention scores (Objectivewise and Total), Test of Significance of Difference between Means was used. The comparison was done for the Total sample, Boys and Girls separately.

The means and standard deviations of the Retention scores (Post test-II - Objectivewise and Total score) were calculated and subjected to the Mean Difference Analysis. Data and results of the t-test are presented in Table 4.7.

TABLE 4.7

Data and Results of the t-test for the Mean Retention Scores (Objectivewise and Total) Between the Experimental and Control Groups (Total sample, Boys and Girls)

Sample	Variable	Experimental Group			Control Group			t-value	Level of Signi-ficance
		M_1	σ_1	N_1	M_2	σ_2	N_2		
Total sample	Knowledge	9.00	3.943	50	5.18	3.274	50	5.27	0.01
	Comprehension	5.78	3.976	50	4.08	2.863	50	2.45	0.05
	Application	7.80	3.995	50	4.54	3.581	50	4.30	0.01
	Analysis	5.54	3.704	50	4.70	3.829	50	1.11	NS
	Synthesis	1.70	1.233	50	1.26	0.803	50	2.11	0.05
	Evaluation	1.36	1.120	50	0.96	0.989	50	1.89	NS
	Retention (Total score)	31.18	16.175	50	20.72	13.085	50	3.56	0.01
Boys	Knowledge	8.65	5.224	20	4.968	3.507	31	2.77	0.01
	Comprehension	5.65	4.815	20	3.645	3.094	31	1.65	NS
	Application	6.75	4.351	20	3.645	3.738	31	2.63	0.01
	Analysis	4.05	3.762	20	3.774	3.676	31	0.26	NS
	Synthesis	1.55	1.432	20	1.065	0.772	31	1.39	NS
	Evaluation	1.20	1.399	20	0.645	0.915	31	1.57	NS
	Retention (Total score)	27.85	19.76	20	17.742	13.743	31	2.00	0.05
Girls	Knowledge	9.233	2.871	30	5.526	2.913	19	4.36	0.01
	Comprehension	5.867	3.391	30	4.789	2.347	19	1.31	NS
	Application	8.50	3.646	30	6.00	2.828	19	2.69	0.01
	Analysis	6.533	3.371	30	6.211	3.675	19	0.31	NS
	Synthesis	1.80	1.095	30	1.579	0.769	19	0.83	NS
	Evaluation	1.467	0.900	30	1.474	0.905	19	0.03	NS
	Retention (Total score)	33.40	13.172	30	25.579	10.543	19	2.18	0.05

NS - Not Significant.

Table 4.7 shows that, for the Total sample, the obtained t-values for Total and Objectivewise Retention in Knowledge and Application are significant at 0.01 level. For the Objectives Comprehension and Synthesis, the t-values are found significant at 0.05 level. But for the Objectives Analysis and Evaluation, the t-values are not found significant even at 0.05 level. These results suggest that, for the Total sample, the Experimental and Control groups differ significantly in terms of the Retention scores (Total and all Objectives except Analysis and Evaluation).

Moreover, the higher mean scores are seen to associate with the Experimental group in all of these comparisons which have shown significant t-values. It provides a satisfactory evidence for the advantage of the ***Experimental*** group over the Control group in terms of the Retention scores.

The individual Retention scores (Post test-II - Total score) of the Experimental and Control groups (Total sample) were graphically represented and studied the pattern of performance. This graphical comparison is presented in Figure 4-7.

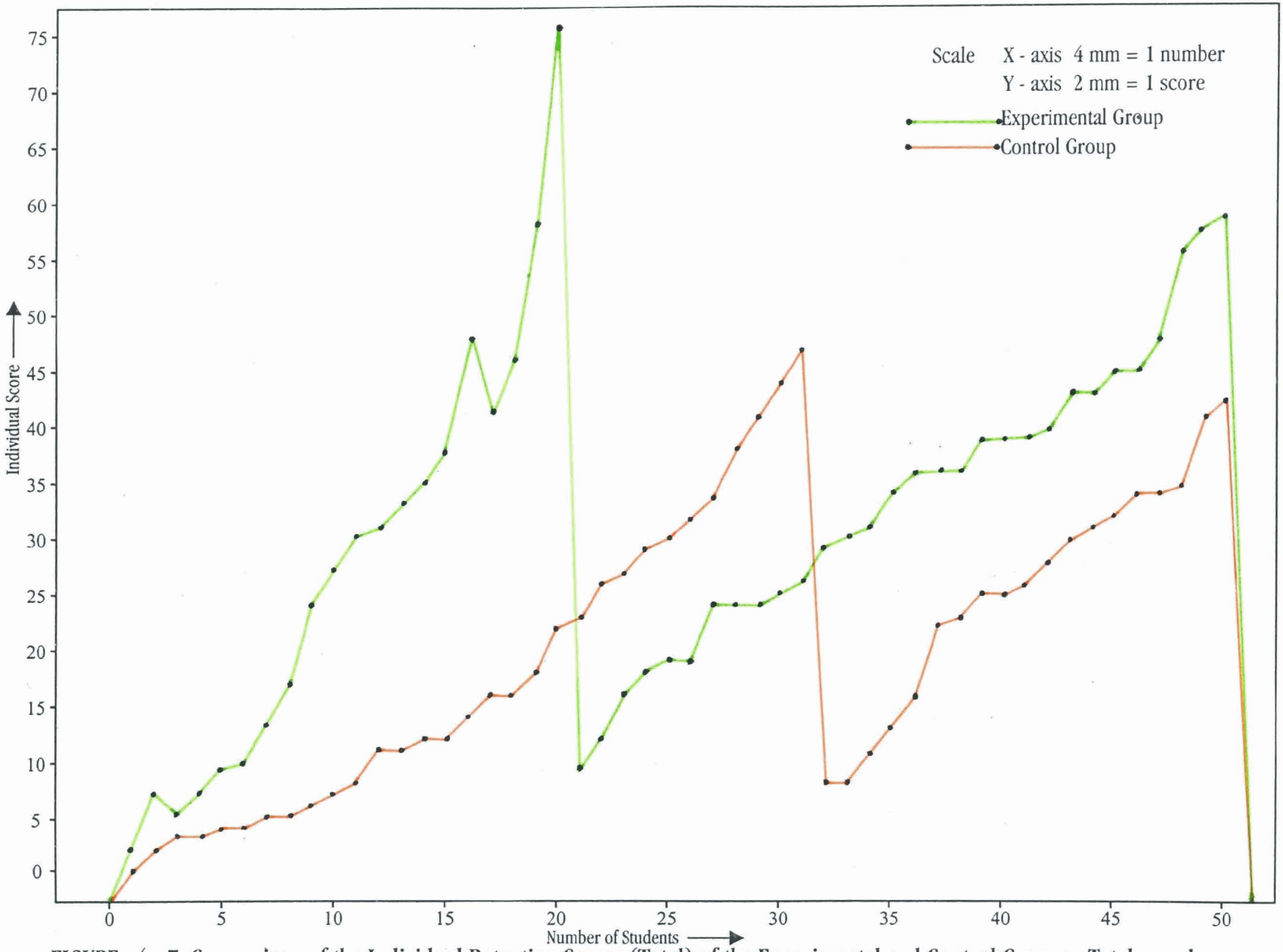


FIGURE 4 - 7 Comparison of the Individual Retention Scores (Total) of the Experimental and Control Groups - Total sample

Figure 4-7 shows a clear difference in the individual Retention scores (Total) of the subjects in the Experimental and Control groups (Total sample). In the graph higher Retention scores are seen with the ***Experimental*** group. This difference is statistically significant as per the results of the Mean Difference Analysis (Table 4.7). In the graph as well as in the Mean Difference Analysis, superiority of the ***Experimental*** group is evident.

Table 4.7 also shows that, for Boys, the obtained t-values for Retention in the Objectives Knowledge and Application are significant at 0.01 level and the t-value for Retention - Total is found significant at 0.05 level. The t-values for all other Objectives (Comprehension, Analysis, Synthesis and Evaluation) are not found significant even at 0.05 level. This suggests that for Boys, significant difference exists between the Experimental and Control groups with regard to the mean Retention scores (Total and Objectivewise Retention in Knowledge and Application). No significant difference is observed for the Objectives Comprehension, Analysis, Synthesis and Evaluation. Besides, in the comparisons of the Total score and of the Objectives Knowledge and Application, the higher mean scores associated with the ***Experimental group*** prove its advantage over the Control group.

Individual Retention scores (Post test-II - Total score) of Boys in the Experimental and Control groups were compared graphically. The graphical representation is presented in Figure 4-8.

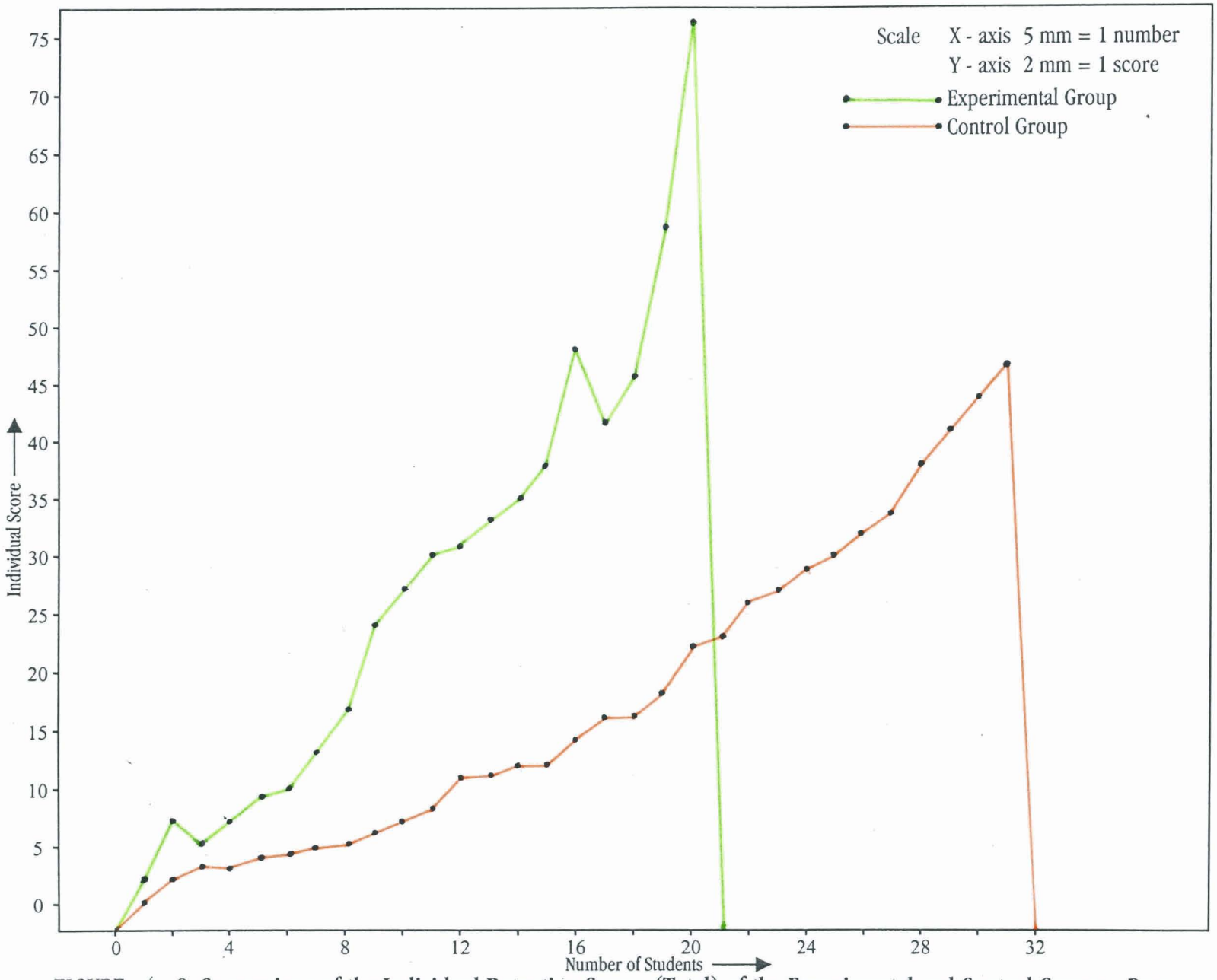


FIGURE 4 - 8 Comparison of the Individual Retention Scores (Total) of the Experimental and Control Groups - Boys

Figure 4-8 shows that, the individual Retention scores (Total) of Boys in the Experimental and Control groups are markedly different. Higher Retention scores are seen with the ***Experimental*** group. Results of the t-test (Table 4.7) suggest that this difference is statistically significant. Thus, the graphical representation and the t-test reveal the advantage of the ***Experimental*** group with regard to the Retention (Total score).

For the sub-sample Girls, the obtained t-values for the Objectives Knowledge and Application are significant at 0.01 level as shown in Table 4.7. The t-value for Retention - Total is found significant at 0.05 level. For Retention in all other Objectives (Comprehension, Analysis, Synthesis and Evaluation), the t-values are not found significant even at 0.05 level. These results indicate significant difference between Girls in the Experimental and Control groups in terms of the Retention scores (Total and for the Objectives namely Knowledge and Application). No significant difference in the Retention scores are found for the Objectives Comprehension, Analysis, Synthesis and Evaluation.

In all of these comparisons which have shown significant t-values for Girls, the higher mean scores are seen to associate with the ***Experimental*** group. It indicates the superiority of Girls in the Experimental group over the Control group.

The individual Retention scores (Post test-II - Total score) of Girls in the Experimental and Control groups were compared graphically and studied the pattern of performance. The graphical representation is presented in Figure 4-9.

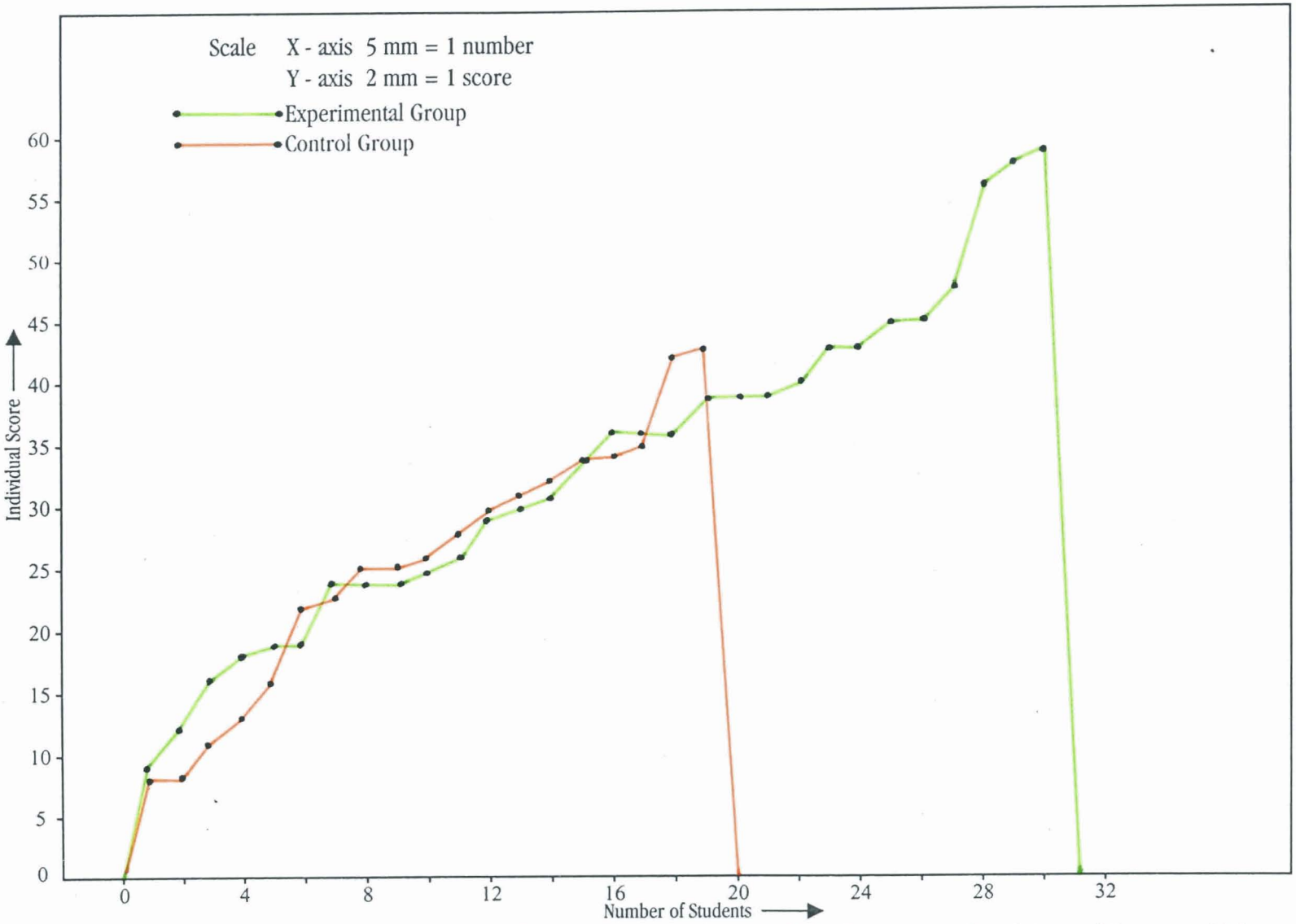


FIGURE 4 - 9 Comparison of the Individual Retention Scores (Total) of the Experimental and Control Groups - Girls

The pattern of the individual Retention scores shows difference in the performance of Girls in the Experimental and Control groups. This difference is statistically significant as per the results of the t-test (Table 4.7). The t-test concerned and the graphical representation are in agreement with the advantage of Girls in the ***Experimental*** group over the Control group.

4.2.1.4. Summary and Discussion of the Mean Difference Analysis

Results of the Mean Difference Analysis conducted for the comparison of the mean Achievement scores (Objectivewise and Total), Gain and Retention scores (Objectivewise and Total) between the Experimental and Control Groups (Total sample, Boys and Girls) are summarised in Table 4.8 and discussed.

TABLE 4.8

Summary of the t-values for Achievement (Objectivewise and Total score), Gain and Retention (Objectivewise and Total score) for the Experimental and Control Groups (Total sample, Boys and Girls)

Sl. No.	Variable	Total sample t-value	Boys t-value	Girls t-value
1.	Knowledge	5.46**	2.98**	4.20**
2.	Comprehension	2.19*	0.99	2.14*
3.	Application	4.07**	2.44*	2.64**
4.	Analysis	1.63	1.14	0.40
5.	Synthesis	3.15**	1.82	2.00*
6.	Evaluation	2.32*	1.67	1.14
7.	**Achievement (Total score)**	3.67**	2.02*	2.70**
8.	**Gain score**	4.35**	2.45*	3.21**
9.	Knowledge	5.27**	2.77**	4.36**
10.	Comprehension	2.45*	1.65	1.31
11.	Application	4.30**	2.63**	2.69**
12.	Analysis	1.11	0.26	0.31
13.	Synthesis	2.11*	1.39	0.83
14.	Evaluation	1.89	1.57	0.03
15.	**Retention (Total score)**	3.56**	2.00*	2.18*

* Significant at 0.05 level.
** Significant at 0.01 level.

From Table 4.8 it can be seen that the 't' values for Achievement - Total and Objectivewise Achievement in Knowledge, Comprehension, Application, Synthesis and Evaluation for Total sample, Achievement - Total and in the Objectives namely Knowledge and Application for Boys,

Achievement - Total and Objectivewise Achievement in Knowledge, Comprehension, Application and Synthesis for Girls are significant. Hence, it can be inferred that Achievement in Malayalam Language (Total and Objectivewise mentioned earlier) differentiate the Experimental and Control groups (Total sample, Boys and Girls). These comparisons which show significant t-values reveal the advantage of the ***Experimental*** group over the Control group as the high mean scores are seen to associate with the Experimental group.

The obtained 't'-values for the Gain scores for the Total sample, Boys and Girls are found significant. It shows that the Experimental and Control groups (Total sample, Boys and Girls) differ significantly in terms of their Gain scores. This difference gives evidence for the superiority of the Experimental group over the Control group, as the high mean scores are seen to associate with the ***Experimental*** group.

Table 4.8 also shows that the obtained 't' values for Retention - Total and Objectivewise scores in Knowledge, Comprehension, Application and Synthesis for Total sample, Total and Objectivewise Retention in Knowledge and Application for Boys and Girls are found significant. Hence, the Retention scores (Total and Objectives mentioned earlier) also ***differentiate*** the Experimental and Control groups (Total sample, Boys and Girls). In all of the comparisons which show significant t-values, high mean scores are seen to attach with the ***Experimental*** group. It suggests that the Experimental group is ***superior*** to the Control group in terms of the Retention scores (Total and Objectivewise mentioned earlier) of the Total sample, Boys and Girls.

Graphical comparisons of the individual scores of the subjects in the Experimental and Control groups (Total sample, Boys and Girls) on Achievement (Total score), Gain and Retention (Total score) were done for a visual examination of the performance. All of the graphical representations revealed remarkable difference in the individual performance of the subjects in the two groups (Total sample, Boys and Girls). All of the graphs showed higher scores (Achievement, Gain and Retention) with the ***Experimental*** group (see Figures 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8 and 4-9).

Results of the Mean Difference Analysis on Achievement and Retention (Objectivewise and Total score) and Gain score between the Experimental and Control groups threw light upon the fact that the ***Experimental*** and Control groups differ significantly even without controlling the Covariates in the Experiment.

4.2.2. ANALYSIS OF COVARIANCE FOR ACHIEVEMENT AND RETENTION

To study whether the Experimental and Control groups differ significantly or not with regard to the Achievement and Retention in Malayalam Language (Objectivewise and Total score) of standard VII pupils, after controlling the effects of three Control Variables, ***Two-way Factorial ANCOVA*** with three Covariates (separately and in combination of the three at a time) was employed. The results of the ANCOVA were further used to examine the relative effectiveness of Cooperative Learning Strategy and Conventional lecture Method of Teaching on Achievement and Retention in Malayalam Language (Objectivewise and Total score)

after controlling the single and combined effects of the Covariates. The variables controlled are, ***Pre-experimental Status*** (Pretest score), ***Verbal-Intelligence and Non-verbal Intelligence,*** separately and in combination of the three. Thus the effectiveness of Instructional Learning Strategies on Achievement and Retention (Objectivewise and Total score) in Malayalam Language was studied. For Achievement and Retention (Objectivewise and Total score) separate ANCOVA with three Covariates (singly and in combination) were utilised.

In the Two-Factor ANCOVA, two levels of Instructional Learning Strategies (***Cooperative Learning Strategy - CLS*** and ***Conventional lecture Method of Teaching - CMT***) and two levels of Classroom Environment (***Above Average Classroom Environment - AACE*** and ***Below Average Classroom Environment - BACE)*** were incorporated as the ***Independent Variables. Achievement*** and ***Retention*** (Objectivewise and Total score) in Malayalam Language were considered as the ***Dependent Variables***.

The categorisation of the sample based on the two levels of Instructional Learning Strategies and Classroom Environment are described in the following section. This scheme of categorisation is used both for Two-way ANCOVA and Two-way ANOVA employed for the analysis of data in the present experiment.

Classificatory Technique

The two Independent Variables, Instructional Learning Strategies and Classroom Environment were classified into two levels. Instructional Learning Strategy was classified into two such as ***Cooperative Learning Strategy (CLS)*** and ***Conventional lecture Method of Teaching (CMT)***. Two

intact classroom groups were taken as the sample. One of these groups (***Experimental group***) was taught through Cooperative Learning Strategy (CLS) and the other group (***Control group***) was taught through Conventional lecture Method of Teaching (CMT).

Actual number of subjects in each of these two groups (CLS and CMT) are as follows.

Instructional Learning Strategies	**Boys**	**Girls**	**Total**
CLS	20	30	50
CMT	31	19	50
Total	51	49	100

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching.

Classroom Environment was Classified into two levels as ***Above Average Classroom Environment (AACE)*** and ***Below Average Classroom Environment (BACE),*** using ***median*** as the cut off point, separately for the Total sample, Boys and Girls.

The medians of the Classroom Environment scores for the Total sample, Boys and Girls were 39, 37 and 39 respectively. Subjects who got the score above the median were considered as the ***Above Average Classroom Environment (AACE)*** group and who got equal to or below the median were considerd as the ***Below Average Classroom Environment (BACE)*** group.

The actual number of subjects (Total sample, Boys and Girls) falling in each of the two levels of Classroom Environment are as follows.

Nature of the Groups	Boys		Girls		Total sample	
	AACE	BACE	AACE	BACE	AACE	BACE
Experimental Group	15	5	18	12	32	18
Control Group	9	22	4	15	11	39
Total	24	27	22	27	43	57

AACE - Above Average Classroom Environment
BACE - Below Average Classroom Environment

Before proceeding to ANCOVA the investigator scrutinised the data used for analysis, with a view to know whether the data are sufficient to ***satisfy the major assumptions*** suggested by Winer (1971), Wildt and Ahtola (1978) and Ferguson (1976) to carry out the ANCOVA procedure. The data were seen to satisfy the following assumptions.

1. The scores on the Dependent Variables are a linear combination of four independent components, ***an overall mean, a treatment effect, a linear covariate effect*** and ***an error term.***

2. The error is normally and independently distributed with mean ***zero*** and ***variance*** $\sigma^2 E$.

3. The (weighted) sum of all groups of the treatment/group effect is ***zero.***

4. The coefficient of the covariate (slope of the regression line) is the ***same*** for each treatment group.

5. The covariate is a fixed ***mathematical variable*** measured without error, not a stochastic variable.

All computations were done using the software, Statistical Package for Social Sciences - (SPSS - Hull & Nie, 1981). Since the frequencies in the treatment cells were unequal, the ANCOVA program for unequal cell frequencies was utilised for analysis.

Tests for Basic Assumptions

The basic assumptions of the ANCOVA, described earlier, were examined by analysing the data collected. The results of this analysis are presented as follows.

a. Linear Relationship Between the Dependent Variable and the Covariates

The nature of the relationship between the Dependent Variables (Achievement and Retention in Malayalam Language - Objectivewise and Total score) and the Covariates (Pre-experimental Status, ie Pretest score, Verbal Intelligence, and Non-verbal Intelligence (separately and in combination of the three) was studied using ***Scatter Plots***. A visual examination of the Scatter Plots revealed that the relationship between the Dependent Variables and the Covariates (separately and in combination) was in linear way, as the scores of the Dependent Variables and the Covariates did not depart ***greatly*** from the line of goodness of fit. Thus the assumption of linear relationship between the Dependent Variables and the Covariates was satisfied.

Scatter Plots of three Covariates against the Dependent Variables (Achievement and Retention - Total score) are presented in specimen Figure 4-10.

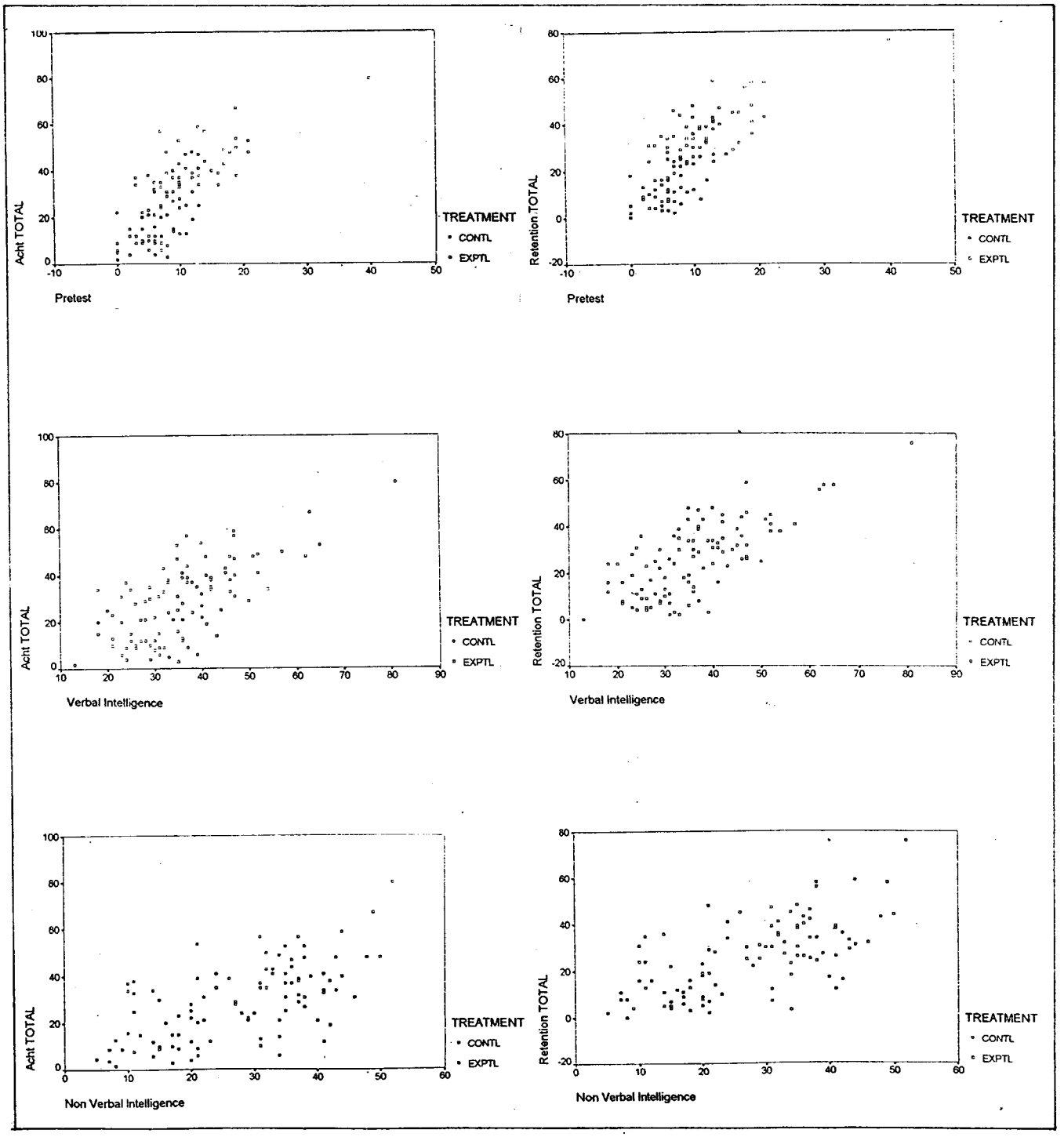


FIGURE 4-10. **Scatter Plots of Achievement and Retention (Total Score) with All the Covariates**

b. Homogeneity of Variance

To satisfy the assumption of homogeneity of variance, separate Analysis of Variance was used. The ANOVA used for this purpose helped the investigator to test whether the ***slopes of the regression lines are the same*** (Homogeneity of within class regression) for the two levels of the Independent Variables (Instructional Learning Strategies and Classroom Environment).

Separate Tests of Homogeneity of Variance were employed for each ANCOVA for Achievement and Retention (Objectivewise and Total score) with the three Covariates (Pre-experimental Status, ie Pretest score, Verbal Intelligence and Non-verbal Intelligence) separately and in combination. In all cases ***the within class regression coefficients were homogeneous*** or the same for the two levels of the Independent Variables (Tables are not presented). The outcome of these tests do not rule against pooling the within class regression (Winer, 1971). Thus it was found that the data were appropriate to fit with the ANCOVA model.

c. Analysis of Variance for Achievement and Retention: Disregarding the Covariates

The investigator used separate Analysis of Variance with each ANCOVA, to study whether the Experimental and Control groups differ significantly or not in Achievement and Retention, ***disregarding the Covariates***. For this purpose, the sum of squares, mean squares of variance along with the corresponding degrees of freedom and the F-ratios were calculated. Four out of seven ANOVA employed, yielded significant F-values for Instructional Learning Strategies on Achievement (Total and

Objectivewise Achievement in Knowledge, Application and Synthesis). Five out of seven ANOVA yielded significant F-values for Instructional Learning Strategies on Retention (Total score and in the Objectives Knowledge, Comprehension, Application and Synthesis). It indicated statistically significant difference in the treatment means. This is due to the fact that the treatment means appear to have different Covariate means. If difference between the criterion means remains after a statistical adjustment, the ANCOVA attempts to approximate the difference in each of the treatment means is equated on the Covariate (Winer, 1971).

4.2.2.1. ANALYSIS OF COVARIANCE FOR ACHIEVEMENT

Two-way Factorial ANCOVA with three Covariates (***Pre-experimental Status,*** ie Pretest score, ***Verbal Intelligence,*** and ***Non-verbal Intelligence*** - separately and in combination of the three at a time) was employed to examine whether there exists any difference between the Experimental and Control groups in terms of Achievement in Malayalam Language (Objectivewise and Total score) even after controlling the effects of the Covariates. By employing Two-Factor ANCOVA, the investigator could further study the relative effectiveness of Cooperative Learning Strategy (CLS) and Conventional lecture Method of Teaching on Achievement in Malayalam Language (Objectivewise and Total score), after controlling the single and combined effects of the Covariates. Two levels of Instructional Learning Strategies (CLS and CMT) and two levels of Classroom Environment (Above Average Classroom Environment - AACE and Below Average Classroom Environment BACE) were incorporatd in the ANCOVA as the ***Independent Variables.*** The Covariates were ***Pre-***

experimental Status (Pretest score), ***Verbal Intelligence*** and ***Non-verbal Intelligence. Achievement in Malayalam Language (Objectivewise and Total score)*** was considered as the ***Dependent Variable***. With every ANCOVA which shows significant F-values, ***Scheffe' Test of Post-hoc Comparison*** was done to find out the group (CLS or CMT) that caused difference in the criterion means. The ANCOVA was employed only for the Total sample. The procedure of the ***ANCOVA for Achievement*** is described in the following sub-sections.

4.2.2.1.a. Analysis of Covariance for Achievement – Pre-experimental Status (Pretest Score) Controlled

To study whether significant difference exists between the Experimental and Control groups or not with regard to the mean scores of Achievement in Malayalam Language (Objectivewise and Total score), Two-way Factorial ANCOVA with ***Pre-experimental Status as Covariate*** was employed.

Summary of the Two-way Factorial ANCOVA is presented in Table 4.9.

TABLE 4.9

Summary of Two-way Factorial ANCOVA for Achievement in Malayalam Language (Objectivewise and Total score) for Total sample - Pre-experimental Status (Pretest Score) as Covariate

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
					Instructional Learning Strategies	Classroom Environment	Instructional Learning Strategies X Classroom Environment
1.	Total sample	100	Knowledge	SS MS df F	169.74 169.74 1 28.44**	14.20 14.20 1 2.38	0.83 0.83 1 0.14
2.		100	Comprehension	SS MS df F	9.98 9.98 1 1.05	21.46 21.46 1 2.27	2.59 2.59 1 0.27
3		100	Application	SS MS df F	97.96 97.96 1 16.20**	0.40 0.40 1 0.07	7.32 7.32 1 1.21
4		100	Analysis	SS MS df F	2.49 2.49 1 0.32	9.14 9.14 1 1.17	4.45 4.45 1 0.57
5		100	Synthesis	SS MS df F	6.39 6.39 1 5.57*	1.73 1.73 1 1.51	0.76 0.76 1 0.66
6		100	Evaluation	SS MS df F	4.31 4.31 1 2.50	0.25 0.25 1 0.14	0.51 0.51 1 0.30
7		100	Achievement (Total)	SS MS df F	1041.24 1041.24 1 10.26**	192.25 192.25 1 1.89	51.53 51.53 1 0.51

* Significant at 0.05 level.

** Significant at 0.01 level.

As per Table 4.9, the obtained F-values for Instructional Learning Strategies on Achievement - Total and Objectivewise scores in Knowledge and Application are found beyond the tabled value (6.90, df: 1, 95) set for 0.01 level of significance. For the Objective Synthesis, the F-value is seen significant at 0.05 level (tabled value = 3.94, df: 1, 95). These significant F-values for Instructional Learning Strategies show statistically significant difference between the criterion means of the groups even after the adjustment is made for the linear effect of the Covariate. Hence results of the ANCOVA suggest that, when a linear adjustment is made for the effect of variation due to the difference in the Pre-experimental Status (Pretest score) of the subjects on Achievement in Malayalam Language, there exists statistically significant difference between the two groups based on Instructional Learning Strategies.

For the Objectivewise Achievement in Comprehension, Analysis and Evaluation, the obtained F-values are not found significant even at 0.05 level. These results suggest that the Experimental and Control groups are equal in their mean Achievement scores (in these Objectives) after the linear adjustment was made for the effect of the Covariate.

Since Classroom Environment was dealt as a ***fixed factor***, the F-values for ***Classroom Environment and Instructional Learning Strategies*** x ***Classroom Environment*** were not taken in to consideration.

Adjusted Means and Post-hoc Comparison

The investigator utilized Scheffe' Test of Post-hoc Comparison with ANCOVA, to determine which one of the two groups (Experimental or Control) causes the variation in the criterion means. By this technique, the

investigator could compare the ***adjusted criterion means*** of relevant groups which show significant F-values.

The Scheffe' Procedure

The F-ratio between the pairs of means was calculated using the within group variance or the error term (Sw^2). Table of F-values was consulted to obtain the value of ***F*** required for significance at 0.05 level and 0.01 level for $df_1 = k-1$ and $df_2 = N-k$. Using the formula ***F' = (k-1) F,*** the F-value for the required df was also calculated. The value of ***F*** was compared with the value of ***F'*** to determine the significance of the difference between means.

The F-ratios were computed between adjusted criterion means (Achievement in Malayalam Language - Total and Objectivewise whichever relevant) for the two groups based on Instructional Learning Strategies (CLS and CMT). Details of the Scheffe' Test of Post-hoc Comparison are presented in Table 4.10.

TABLE 4.10

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Achievement in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Significance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS – CMT	9.02	6.05	36.74	3.94	6.90	0.01
	100	Application	CLS - CMT	7.63	5.38	20.92	3.94	6.90	0.01
	100	Synthesis	CLS - CMT	2.02	1.44	7.18	3.94	6.90	0.01
	100	Achievement (Total)	CLS - CMT	33.38	26.04	13.26	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As Table 4.10 shows, the F-ratios obtained for the pairs (CLS - CMT groups) are 36.74 (Knowledge), 20.92 (Application), 7.18 (Synthesis) and 13.26 (Total score) which are significant at 0.01 level. These significant differences are noticed for the two groups as the F-values are greater than the values of F' (6.90) at 0.01 level of significance.

It can be inferred from these results that for the Total sample, the two groups, based on Instructional Learning Strategies (CLS and CMT) ***differ significantly*** in their mean Achievement scores (Total and in the Objectiveswise scores in Knowledge, Application and Synthesis). In all of these comparisons high mean scores were seen to associate with the ***Experimental group*** to which ***Cooperative Learning Strategy*** was used. It indicates the effectiveness of Cooperative Learning Strategy (CLS) over the Conventional lecture Method of Teaching (CMT) with regard to

Achievement in Malayalam Language (Total and Objectivewise mentioned earlier).

4.2.2.1.b. Analysis of Covariance for Achievement - Verbal Intelligence Controlled

Two-way Factorial ANCOVA with ***Verbal Intelligence as Covariate*** was utilized to examine whether significant difference exists or not in the mean scores of Achievement after controlling the effect of the Covariate. Results of the ANCOVA was used to compare the effectiveness of Cooperative Learning Strategy and Conventional lecture Method of Teaching on Achievement in Malayalam Language (Objectivewise and Total score). Summary of the Two-way Factorial ANCOVA is presented in Table 4.11.

TABLE 4.11

Summary of Two-way Factorial ANCOVA for Achievement in Malayalam Language (Objectivewise and Total score) for Total sample - Verbal Intelligence as Covariate

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Environ-ment	Instruct-ional Learning Strategies x Classroom Environ-ment
1.	Total sample	100	Knowledge	SS MS df F	230.39 230.39 1 33.63**	3.27 3.27 1 0.48	0.38 0.38 1 0.06
2.		100	Compre-hension	SS MS df F	25.86 25.86 1 2.52	7.99 7.99 1 0.78	1.79 1.79 1 0.17
3		100	Application	SS MS df F	144.03 144.03 1 20.91**	1.76 1.76 1 0.26	5.75 5.75 1 0.83
4		100	Analysis	SS MS df F	13.78 13.78 1 1.46	0.98 0.98 1 0.10	4.06 4.06 1 0.43
5		100	Synthesis	SS MS df F	10.28 10.28 1 8.14**	0.47 0.47 1 0.37	0.88 0.88 1 0.70
6		100	Evaluation	SS MS df F	6.23 6.23 1 3.80	0.01 0.01 1 0.01	0.25 0.25 1 0.16
7		100	Achievement (Total)	SS MS df F	1737.27 1737.27 1 14.43**	25.96 25.96 1 0.22	35.18 35.18 1 0.29

* Significant at 0.05 level.

** Significant at 0.01 level.

Table 4.11 shows that the obtained F-values for Instructional Learning Strategies on Achievement - Total score and on the Objectivewise scores namely Knowledge, Application and Synthesis are beyond the tabled value (6.90, df: 1, 95) set for 0.01 level of significance. These results suggest that even after making an adjustment for the linear effect of the Covariate (Verbal Intelligence) on Achievement, the two groups (CLS and CMT) show statistically significant difference in their mean Achievement scores (Total and Objectivewise mentioned earlier).

For the Objectives Comprehension, Analysis and Evaluation the F-values are not significant. Hence it can be inferred that the two groups based on Instructional Learning Strategies (CLS and CMT) do not differ significantly in their mean Achievement in Comprehension, Analysis and Evaluation, even after controlling the linear effect of the Covariate (Verbal Intelligence).

Since Classroom Environment was treated as a ***fixed factor***, F-values for ***Classroom Environment*** and its ***interaction with Instructional Learning Strategies*** are not considered here.

Adjusted Means and Post-hoc Comparison

Scheffe' Test of Post-hoc Comparison was used to determine which one of the two groups based on Instructional Learning Strategies (CLS - CMT) produced variation in the criterion means. By this, the adjusted criterion means of the Experimental and Control groups were compared. The comparisons were done only for the criterion means which showed significant difference in the ANCOVA.

The F-ratios were computed between the adjusted criterion means of Achievement in Malayalam Language (Total and in the Objectives Knowledge, Application and Synthesis) for the two groups based on Instructional Learning Strategies (CLS and CMT). Details of the Scheffe' Test are presented in Table 4.12.

TABLE 4.12

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Achievement in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Significance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS – CMT	9.25	5.82	42.87	3.94	6.90	0.01
	100	Application	CLS - CMT	7.86	5.15	26.64	3.94	6.90	0.01
	100	Synthesis	CLS - CMT	2.09	1.37	10.40	3.94	6.90	0.01
	100	Achievement (Total)	CLS - CMT	34.41	25.00	18.39	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

From Table 4.12, it is seen that the obtained F-ratios for the pairs (CLS and CMT) are 42.87 (Knowledge), 26.64 (Comprehension), 10.40 (Synthesis) and 18.39 (Total score). Significant difference at 0.01 level can be noticed for the two groups (CLS and CMT) as the corresponding F-values exceed the value of F' (6.90) at 0.01 level of significance. It proves that the two levels of Instructional Learning Strategies (CLS and CMT) differ significantly in the mean Achievement scores (Total and Objectivewise namely Knowledge, Application and Synthesis) in Malayalam Language.

High mean Achievement scores of the Experimental group (CLS) give the evidence for its ***superiority*** over the Control group (CMT).

4.2.2.1.c. Analysis of Covariance for Achievement - Non-verbal Intelligence Controlled

Effect of the Covariate (Non-verbal Intelligence) on Achievement was controlled statistically and then the effectiveness of two Instructional Learning Strategies (Cooperative Learning Strategy and Conventional lecture Method of Teaching) on Achievement were compared. Two-way ANCOVA with Non-verbal Intelligence as Covariate was used for this purpose. Summary of the ANCOVA is presented in Table 4.13.

TABLE 4.13

Summary of Two-way Factorial ANCOVA for Achievement in Malayalam Language (Objectivewise and Total score) for Total sample - Non-verbal Intelligence as Covariate

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Environ-ment	Instruct-ional Learning Strategies x Classroom Environ-ment
1.	Total sample	100	Knowledge	SS MS df F	246.51 246.51 1 30.83**	3.20 3.20 1 0.40	0.35 0.35 1 0.04
2.		100	Compre-hension	SS MS df F	30.40 30.40 1 2.85	8.34 8.34 1 0.78	0.15 0.15 1 0.01
3		100	Application	SS MS df F	157.14 157.14 1 19.02**	1.90 1.90 1 0.23	1.69 1.69 1 0.20
4		100	Analysis	SS MS df F	17.16 17.16 1 1.75	1.12 1.12 1 0.11	0.34 0.34 1 0.03
5		100	Synthesis	SS MS df F	11.25 11.25 1 8.52**	0.49 0.49 1 0.37	1.89 1.89 1 1.43
6		100	Evaluation	SS MS df F	6.94 6.94 1 4.03*	0.01 0.01 1 0.01	0.03 0.03 1 0.02
7		100	Achievement (Total)	SS MS df F	1925.52 1925.52 1 13.98**	26.65 26.65 1 0.19	1.40 1.40 1 0.01

* Significant at 0.05 level.

** Significant at 0.01 level.

The F-values obtained for Instructional Learning Strategies on Achievement in Malayalam Language, (Total score and Objectivewise namely Knowledge, Application and Synthesis) are significant at 0.01 level (tabled value = 6.90, df: 1, 95) as shown in Table 4.13. For the Objective Evaluation, the F-value is significant at 0.05 level (tabled value = 3.94, df: 1, 95). It can be inferred from these results that, even after a linear adjustment was made for the effect of variation due to the difference in the Non-verbal Intelligence of the subjects, there exists statistically significant difference between the two groups based on Instructional Learning Strategies (CLS and CMT).

For the Objectives Comprehension and Analysis the F-values are not found significant even at 0.05 level. It suggests that for these Objectives, the two groups (CLS and CMT) are similar in their mean Achievement scores after removing the effect of the Covariate, Non-verbal Intelligence.

As Classroom Environment was considered as a ***fixed factor***, its ***main effect*** and ***interaction effect of Instructional Learning Strategies and Classroom Environment*** are not considered for interpretation.

Adjusted Means and Post-hoc Comparison

Scheffe' Test of Post-hoc Comparison was used to find out the group which created variation in the criterion means. For this, the adjusted criterion means of the two groups (CLS and CMT) which showed significant difference in the ANCOVA, were compared.

The F-ratios were computed between the adjusted criterion means of Achievement in Malayalam Language (Total and relevant Objectives) of the

two groups based on Instructional Learning Strategies (CLS and CMT). Details of the Scheffe' Test are presented in Table 4.14.

TABLE 4.14

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Achievement in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Significance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS – CMT	9.31	5.76	39.26	3.94	6.90	0.01
	100	Application	CLS - CMT	7.92	5.10	24.21	3.94	6.90	0.01
	100	Synthesis	CLS - CMT	2.11	1.35	10.85	3.94	6.90	0.01
	100	Evaluation	CLS –CMT	1.85	1.26	5.14	3.94	6.90	0.05
	100	Achievement (Total)	CLS - CMT	34.66	24.76	17.80	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As Table 4.14 shows, the significant F-ratios (at 0.01 level) for the comparison are 39.26, 24.21, 10.85 and 17.80 respectively for Knowledge, Application, Synthesis and for Achievement Total score. These F-values show significant difference between the groups (CLS and CMT) at 0.01 level as they exceed the value of F' (6.90) at 0.01 level of significance. F-value for the Objective Evaluation (5.14) shows significant difference at 0.05 level as it exceeds the value of F' (3.94) at 0.05 level. It suggests that Cooperative Learning Strategy (Experimental group) and Conventional lecture Method of Teaching (Control group) differ significantly in their mean Achievement

in Total score and Objectivewise scores namely Knowledge, Appliction, Synthesis and Evaluation.

The Experimental group to which Cooperative Learning Strategy was applied ***scored higher*** mean Achievement when compared to the Control group to which the Conventional lecture Method was applied.

4.2.2.1.d. Analysis of Covariance for Achievement - Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence Controlled in Combination

Two-way Factorial ANCOVA with Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence as Covariates in combination at a time was utilized to investigate the relative effectiveness of Cooperative Learning Strategy (CLS) and Conventional lecture Method of Teaching (CMT) on Achievement in Malayalam Language, after making a linear adjustment for the combined effect of these Covariates. Summary of the Two Factor ANCOVA is presented in Table 4.15.

TABLE 4.15

Summary of Two-way Factorial ANCOVA for Achievement in Malayalam Language (Objectivewise and Total score) for Total sample - Pre-experimental Status (Pretest Score), Verbal intelligence and Non-verbal Intelligence as Covariates in Combination

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Environ-ment	Instruct-ional Learning Strategies X Classroom Environ-ment
1.	Total sample	100	Knowledge	SS MS df F	184.11 184.11 1 34.64**	11.52 11.52 1 2.17	0.18 0.18 1 0.03
2.		100	Compre-hension	SS MS df F	13.75 13.75 1 1.56	18.69 18.69 1 2.13	0.01 0.01 1 0.01
3		100	Application	SS MS df F	108.81 108.81 1 19.84**	0.06 0.06 1 0.01	2.17 2.17 1 0.40
4		100	Analysis	SS MS df F	4.02 4.02 1 0.55	8.03 8.03 1 1.10	0.51 0.51 1 0.07
5		100	Synthesis	SS MS df F	7.25 7.25 1 6.67*	1.49 1.49 1 1.37	1.76 1.76 1 1.62
6		100	Evaluation	SS MS df F	5.38 5.38 1 3.30	0.10 0.10 1 0.06	0.05 0.05 1 0.03
7		100	Achievement (Total)	SS MS df F	1205.75 1205.75 1 13.84**	152.25 152.25 1 1.75	0.57 0.57 1 0.01

* Significant at 0.05 level.

** Significant at 0.01 level.

Table 4.15 shows that the obtained F-values for Instructional Learning Strategies on Achievement - Total score and Objectivewise scores namely Knowledge, and Application are significant at 0.01 level (tabled value = 6.90, df:1, 95). For the Objective Synthesis the F-value is found significant at 0.05 level (tabled value = 3.94, df:1, 95). These results suggest that, there exists statistically significant difference between the two groups based on Instructional Learning Strategies (CLS and CMT) in terms of the mean Achievement scores in Malayalam Language (Total score, and the Objectives mentioned earlier) even after making a linear adjustment to remove the combined effect of the three Covariates at a time.

The F-values for the Objectives Comprehension, Analysis and Evaluation are not found significant even at 0.05 level. So in the case of Achievement in these Objectives the performance of the two groups (CLS and CMT) can said to be similar after removing the combined effect of the Covariates.

Since Classroom Environment was dealt as a ***fixed factor*** in the Two-way ANCOVA, the F-values for ***Classroom Environment*** and ***Instructional Learning Strategies x Classroom Environment*** are not considered for interpretation.

Adjusted Means and Post-hoc Comparison

Scheffe' Test of Post-hoc Comparison was utilized to compare the adjusted criterion means of the Experimental and Control groups. It was done to find out the group that caused the difference in the criterion means, as shown in the ANCOVA.

The F-ratios were computed between the adjusted criterion means of Achievement in Malayalam Language (Total and relevant Objectives) of the Experimental and Control groups (CLS and CMT). Details of the Scheffe' Test are presented in Table 4.16.

TABLE 4.16

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Achievement in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Significance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS - CMT	9.08	5.99	45.06	3.94	6.90	0.01
	100	Application	CLS - CMT	7.70	5.32	25.76	3.94	6.90	0.01
	100	Synthesis	CLS - CMT	2.04	1.42	8.64	3.94	6.90	0.01
	100	Achievement (Total)	CLS - CMT	33.67	25.75	17.99	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lectureMethod of Teaching

The obtained F-ratios for the comparison are found to be 45.06, 25.76, 8.64 and 17.99 respectively for the Objectives Knowledge, Application, Synthesis and for the Total score as shown in Table 4.16. All of these values show significant difference between the two groups (CLS and CMT) at 0.01 level as they exceed the value of F' (6.90) at 0.01 level of significance. Hence it can be inferred that, the Experimental and Control groups ***differ significantly*** in their mean Achievement scores (Total and Objectivewise namely Knowledge, Application and Synthesis). High mean scores associated with the Experimental group (CLS) prove its ***superiority*** over the Control group (CMT).

4.2.2.1.e. Summary and Discussion of Analysis of Covariance for Achievement

Results of 28 ANCOVA employed to study the effectiveness of Instructional Learning Strategies (Cooperative Learning Strategy and Conventional lecture Method of Teaching) on Achievement (Objectivewise and Total score) in Malayalam Language are summarised and discussed in this sub-section.

The F-values obtained for the 28 ANCOVA are consolidated and presented in Table 4.17.

TABLE 4.17

Summary of the F-values of ANCOVA for Achievement

Sl. No.	Source of Variation	Dependent Variable	Covariates			
			Pre-experimental Status (Pretest Score)	Verbal Intelligence	Non-verbal Intelligence	Pre-experimental Status, Verbal Intelligence and Non-verbal Intelligence
			F-Values			
1.	Instructional Learning Strategies	Knowledge	28.44**	33.63**	30.83**	34.64**
2.		Compre-hension	1.05	2.52	2.85	1.56
3.		Application	16.20**	20.91**	19.02**	19.84**
4.		Analysis	0.32	1.46	1.75	0.55
5.		Synthesis	5.57*	8.14**	8.52**	6.67*
6.		Evaluation	2.50	3.80	4.03*	3.30
7.		Achievement (Total)	10.26**	14.43**	13.98**	13.84**

* Significant at 0.05 level

** Significant at 0.01 level

As Table 4.17 shows altogether 28 ANCOVA were employed for Achievement (Objectivewise and Total score), using Pre-experimental Status (Pre test score), Verbal Intelligence and Non-verbal Intelligence as Covariates singly and in combination of the three at a time. This was done with a view to examine whether variation in the mean Achievement scores (Objectivewise and Total score) of the Experimental and Control groups occurs or not after treatment.

When the effect of Pre-experimental Status was controlled, F-values for Instructional Learning Strategies were found significant in four ANCOVA. Hence the Experimental and Control groups differ significantly in Achievement (Total and all Objectivewise scores except Comprehension, Analysis and Evaluation). Significant difference in Total and Objectivewise Achievement except in Comprehension, Analysis and Evaluation was noted after treatment when the effect of Verbal-Intelligence was removed out. This is observed in four ANCOVA. In five ANCOVA, the Experimental and Control groups differed significantly in Achievement (Total and Objectivewise scores except in Comprehension and Analysis), when the effect of Non-verbal Intelligence was controlled. Variation in Achievement - Total and Objectivewise scores except in Comprehension, Analysis and Evaluation was observed between the Experimental and Control groups after treatment in four ANCOVA, when the three Covariates were controlled in combination at a time.

The F-values for Instructional Learning Strategies on Achievement in the Objectives Comprehension, Analysis and Evaluation were not found

significant except in one ANCOVA with Non-verbal Intelligence as Covariate.

Out of 28 ANCOVA employed to study the difference between the Experimental and Control groups in Achievement (Objectivewise and Total score) 17 ANCOVA yielded significant difference. From these results it can be inferred that treatment in the Experimental group (Cooperative Learning Strategy) was comparatively more effective than the Control treatment (Conventional lecture Method). The Post-hoc comparison employed on the adjusted criterion means also revealed the advantage of the Experimental group.

4.2.2.2. ANALYSIS OF COVARIANCE FOR RETENTION

This part of the Chapter is utilized to present the procedure of the Two-way Factorial ANCOVA employed to study the difference in Retention (Objectiwise and Total score) between the Experimental and Control groups, after controlling the single and combined effects of the Covariates. By employing the ANCOVA, it was further aimed at studying the relative effectiveness of Cooperative Learning Strategy and Conventional lecture Method of Teaching on Retention. Two levels of Instructional Learning Strategies (CLS and CMT) and two levels of Classroom Environment (Above Average Classroom Environment - AACE and Below Average Classroom Environment - BACE) were incorporated in the ANCOVA as the ***Independent Variables***. The Covariates were ***Pre-experimental Status*** (Pretest score), ***Verbal Intelligence*** and ***Non-verbal Intelligence. Retention in Malayalam Language (Objectivewise and Total score)*** was considered as the ***Dependent Variable.***

Wherever significant F-values obtained in the ANCOVA, Scheffe' Test of Post-hoc Comparison of adjusted means was used to find out the group which created significant difference in the criterion means.

4.2.2.2.a. Analysis of Covariance for Retention - Pre-experimental Status (Pretest Score) Controlled

Two-way Factorial ANCOVA with Pre-experimental Status (Pretest score) as Covariate was employed to compare the effectiveness of Cooperative Learning Strategy (CLS) and Conventional lecture Method of Teaching (CMT) on Retention in Malayalam Language (Objectivewise and Total score), when the effect of the Covariate (Pre-experimental Status) on the Dependent Variable was statistically controlled. Summary of the ANCOVA is presented in Table 4.18.

TABLE 4.18

Summary of Two-way Factorial ANCOVA for Retention in Malayalam Language (Objectivewise and Total score) for Total sample - Pre-experimental Status (Pretest Score) as Covariate

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Environ-ment	Instruct-ional Learning Strategies X Classroom Environ-ment
1.	Total sample	100	Knowledge	SS MS df F	153.94 153.94 1 26.44**	22.48 22.48 1 3.86	0.12 0.12 1 0.02
2.		100	Compre-hension	SS MS df F	16.80 16.80 1 2.53	4.18 4.18 1 0.63	11.47 11.47 1 1.73
3		100	Application	SS MS df F	132.35 132.35 1 19.39**	0.41 0.41 1 0.06	0.50 0.50 1 0.07
4		100	Analysis	SS MS df F	0.33 0.33 1 0.04	12.89 12.89 1 1.50	25.13 25.13 1 2.92
5		100	Synthesis	SS MS df F	1.83 1.83 1 2.88	0.40 0.40 1 0.63	5.32 5.32 1 8.37**
6		100	Evaluation	SS MS df F	0.16 0.16 1 0.21	2.12 2.12 1 2.67	3.62 3.62 1 4.55*
7		100	Retention (Total)	SS MS df F	852.24 852.24 1 9.69**	140.15 140.15 1 1.59	168.23 168.23 1 1.91

* Significant at 0.05 level.

** Significant at 0.01 level.

As per Table 4.18, the F-values obtained for Instructional Learning Strategies (CLS and CMT) on Retention in Malayalam Language (Total score and Objectivewise scores namely Knowledge and Application) are found significant at 0.01 level (tabled value = 6.90, df: 1, 95). Even after a linear adjustment was made for the effect of variation due to the difference in the Pre-experimental Status of the subjects, there exists statistically significant difference between the two groups based on Instructional Learning Strategies (CLS and CMT) in terms of the mean Retention scores (Total and Objectivewise namely Knowledge and Application).

The F-values for the Objectives Comprehension, Analysis, Synthesis and Evaluation are not found significant. Hence, no significant difference between the two groups based on Instructional Learning Strategies (CLS and CMT) is noted in the mean Retention scores in these Objectives after the linear adjustment to remove the effect of the Pre-experimental Status (Pretest score).

As Classroom Environment was considered as a ***fixed factor***, its ***main effect*** and ***interaction effect of Instructional Learning Strategies and Classroom Environment*** are not considered for interpretation.

Adjusted Means and Post-hoc Comparison

Follow up analysis was done to find out the group, that caused the difference in the mean Retention scores as revealed from the ANCOVA. For this purpose Scheffe' Test of Post-hoc Comparison was used.

The adjusted criterion means of Retention in Malayalam Language (Total and relevant Objectives) of the two groups based on Instructional

Learning Strategies (CLS and CMT) which showed significant F-values in the ANCOVA, were compared. Details of the Scheffe' Test are presented in Table 4.19.

TABLE 4.19

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Retention in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Signi-ficance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS - CMT	8.66	5.83	34.18	3.94	6.90	0.01
	100	Application	CLS - CMT	7.62	5.00	25.08	3.94	6.90	0.01
	100	Retention (Total)	CLS - CMT	30.47	23.83	12.53	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

It is seen in Table 4.19 that the F-ratios for the pairs (CLS and CMT) are 34.18 (Knowledge), 25.08 (Application) and 12.53 (Total score). Significant difference at 0.01 level can be noticed for the two groups as the corresponding F-values exceed the value of F' (6.90) at 0.01 level of significance. From these results it can be inferred that the two levels of Instructional Learning Strategies (CLS and CMT) differ significantly in their mean Retention scores (Total and for the Objectives Knowledge and Application). In all of these comparisons, higher mean Retention scores are seen to associate with the ***Experimental group*** (CLS). It shows the advantage of the Experimental group over the Control group (CMT).

4.2.2.2.b. Analysis of Covariance for Retention - Verbal Intelligence Controlled

After controlling the Covariate, Verbal Intelligence, the relative effectiveness of the two Instructional Learning Strategies (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT) on Retention in Malayalam Language (Objectivewise and Total score) was examined. Two-way Factorial ANCOVA with Verbal Intelligence as Covariate was utilised for this purpose. Data and results of the Two-way ANCOVA are presented in Table 4.20.

TABLE 4.20

Summary of Two-way Factorial ANCOVA for Retention in Malayalam Language (Objectivewise and Total score) for Total sample - Verbal Intelligence as Covariate

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Enviro-nment	Instructional Learning Strategies X Classroom Environment
1.	Total sample	100	Knowledge	SS MS df F	213.34 213.34 1 34.35**	7.51 7.51 1 1.21	0.65 0.65 1 0.10
2.		100	Compre-hension	SS MS df F	35.25 35.25 1 4.82*	0.10 0.10 1 0.01	9.69 9.69 1 1.33
3		100	Application	SS MS df F	188.98 188.98 1 24.86**	2.07 2.07 1 0.27	0.11 0.11 1 0.01
4		100	Analysis	SS MS df F	1.40 1.40 1 0.16	3.68 3.68 1 0.42	20.92 20.92 1 2.39
5		100	Synthesis	SS MS df F	3.39 3.39 1 4.77*	1.21 1.21 1 1.70	5.17 5.17 1 7.25**
6		100	Evaluation	SS MS df F	0.67 0.67 1 0.83	1.15 1.15 1 1.43	3.26 3.26 1 4.03*
7		100	Retention (Total)	SS MS df F	1454.18 1454.18 1 14.76**	12.28 12.28 1 0.12	127.50 127.50 1 1.29

* Significant at 0.05 level.

** Significant at 0.01 level.

As Table 4.20 shows, the F-values for Instructional Learning Strategies on Retention in Total score and Objectivewise scores in Knowledge and Application are significant at 0.01 level as they are found beyond the tabled value (6.90, df:1, 95) set for 0.01 level of significance. For the Objectives Comprehension and Synthesis the F-values are found significant at 0.05 level (tabled value = 3.94, df:1, 95). Statistically significant difference in the mean Retention scores (Total and Objectivewise mentioned earlier) is observed after removing the effect of the Covariate (Verbal Intelligence). Hence the Experimental and Control groups ***differ significantly*** in terms of Retention (Total and Objectivewise scores in Knowledge and Application).

For the Objectives Analysis and Evaluation, the F-values are not found significant. Hence in the case of Retention in these Objectives, the two groups (CLS and CMT) possess no significant difference.

The Independent Variable ***Classroom Environment*** is not discussed in the ANCOVA procedure as it was treated as a ***fixed factor***.

Adjusted Means and Post-hoc Comparison

After ANCOVA Scheffe' Test of Post-hoc Comparison was utilized wherever significant F-ratios were obtained. This was done to find out which of the two groups created difference in the mean Retention scores. The adjusted criterion means of Retention in Malayalam Language (Total and relevant Objectives) of the two groups based on Instructional Learning Strategies (CLS and CMT) were compared. Details of the Scheffe' Test of Post-hoc Comparison are presented in Table 4.21.

TABLE 4.21

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Retention in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Signi-ficance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS - CMT	8.89	5.60	43.78	3.94	6.90	0.01
	100	Compre-hension	CLS - CMT	5.87	4.53	6.15	3.94	6.90	0.05
	100	Application	CLS - CMT	7.86	4.76	31.69	3.94	6.90	0.01
	100	Synthesis	CLS - CMT	1.81	1.39	6.09	3.94	6.90	0.05
	100	Retention (Total)	CLS - CMT	31.46	22.85	18.81	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

F-ratios obtained in the Post-hoc Comparison are 43.78 (Knowledge), 6.15 (Comprehension), 31.69 (Application), 6.09 (Synthesis) and 18.81 (Total score) as shown in Table 4.21. For the Total score and Objectivewise scores in Knowledge, and Application, the F-values are found significant at 0.01 level and for the Objectives Comprehension and Synthesis the F-values are found significant at 0.05 level, as they exceed the corresponding values of F' (6.90 and 3.94).

Hence, the comparison reveals that the Experimental and Control groups show ***significant difference*** in their mean Retention scores in Malayalam Language (Total and Objectives mentioned earlier). Treatment in the Experimental group (Cooperative Learning Strategy - CLS) is seen ***more effective*** than that of the Control group (Conventional lecture Method of Teaching - CMT) as it caused higher mean Retention scores.

4.2.2.2.c. Analysis of Covariance for Retention - Non-verbal Intelligence Controlled

To control the effect of the Non-verbal Intelligence of the subjects on Retention, and to study the difference in Retention between the Experimental and Control groups, Two-way Factorial ANCOVA with Non-verbal Intelligence as Covariate was used.

Summary of the Two-way ANCOVA employed is presented in Table 4.22.

TABLE 4.22

Summary of Two-way Factorial ANCOVA for Retention in Malayalam Language (Objectivewise and Total score) for Total sample -Non-verbal Intelligence as Covariate

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Environ-ment	Instructional Learning Strategies X Classroom Environment
1.	Total sample	100	Knowledge	SS MS df F	231.90 231.90 1 27.96**	6.93 6.93 1 0.84	3.28 3.28 1 0.40
2.		100	Compre-hension	SS MS df F	40.77 40.77 1 5.01*	0.09 0.09 1 0.01	3.95 3.95 1 0.49
3		100	Application	SS MS df F	204.00 204.00 1 23.78**	2.01 2.01 1 0.23	1.22 1.22 1 0.14
4		100	Analysis	SS MS df F	2.75 2.75 1 0.28	3.63 3.63 1 0.37	11.42 11.42 1 1.17
5		100	Synthesis	SS MS df F	3.83 3.83 1 4.92*	1.24 1.24 1 1.59	4.09 4.09 1 5.24*
6		100	Evaluation	SS MS df F	0.92 0.92 1 0.98	1.03 1.03 1 1.10	2.94 2.94 1 3.13
7		100	Retention (Total)	SS MS df F	1637.95 1637.95 1 13.21**	11.08 11.08 1 0.09	38.25 38.25 1 0.31

* Significant at 0.05 level.

** Significant at 0.01 level.

Results of the ANCOVA show that the F-values obtained for Instructional Learning Strategies on Retention in the Total score and Objectivewise scores in Knowledge and Application are significant at 0.01 level (tabled value = 6.90, df:1, 95). For the Objectives Comprehension and Synthesis, the F-values are found significant at 0.05 level (tabled value = 3.94, df: 1, 95). Hence, it can be inferred that, even after controlling the effect of Non-verbal Intelligence, the two groups (Experimental and Control groups) ***differ significantly*** in terms of the mean Retention scores (Total score and Objectivewise mentioned earlier).

It is also noted that F-values for the Objectives Analysis and Evaluation are not significant even at 0.05 level. It suggests that the two groups (Experimental and Control groups) do not differ in their mean Retention scores in the Objectives Analysis and Evaluation.

Interpretation of the F-values for ***Classroom Environment*** and ***Instructional Learning Strategies x Classroom Environment*** on Retention is not needed in this context, because Classroom Environment has been considered as a ***fixed factor*** in the ANCOVA.

Adjusted Means and Post-hoc Comparison

Scheffe' Test of Post-hoc Comparison was used to find out the group that created difference in the mean Retention scores as revealed from the significant F-ratios in the ANCOVA.

The adjusted criterion means of Retention in Malayalam Language of the Experimental and Control groups which show significant difference in

the ANCOVA were compared. Results of the Scheffe' Test of Post-hoc Comparison are presented in Table 4.23.

TABLE 4.23

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Retention in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Significance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS - CMT	8.96	5.53	35.59	3.94	6.90	0.01
	100	Compre-hension	CLS - CMT	5.92	4.48	6.38	3.94	6.90	0.05
	100	Application	CLS - CMT	7.92	4.70	30.25	3.94	6.90	0.01
	100	Synthesis	CLS - CMT	1.82	1.38	6.26	3.94	6.90	0.05
	100	Retention (Total)	CLS - CMT	31.72	22.58	16.81	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Results of the Scheffe' Test show that for Retention - Total (F = 16.81) and for the Objectives Knowledge (F = 35.59) and Application (F = 30.25), the F-ratios exceed the value of F' (6.90) at 0.01 level of significance. For the Objectives Comprehension (F=6.38) and Synthesis (F=6.26), the F-ratios exceed the value of F' (3.94) at 0.05 level of significance. These results indicate that, the Experimental (CLS) and the Control (CMT) groups ***differ significantly*** in the mean Retention (Total and Objectivewise scores in Knowledge, Comprehension, Application and Synthesis). Treatment in the Experimental group (CLS) is found more ***advantageous*** than treatment in the Control group (CMT) as it created higher mean Retention scores for the Experimental group.

4.2.2.2.d. Analysis of Covariance for Retention - Pre-experimental Status (Pretest Score), Verbal Intelligence and Non-verbal Intelligence Controlled in Combination

Two-way Factorial ANCOVA with Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence as Covariates in combination, was utilized to investigate the relative effectiveness of Cooperative Learning Strategy (CLS) and Conventional lecture Method of Teaching (CMT) on Retention in Malayalam Language. Data and results of the Two-way Factorial ANCOVA are presented in Table 4.24.

TABLE 4.24

Summary of Two-way Factorial ANCOVA for Retention in Malayalam Language (Objectivewise and Total score) for Total sample - Pre-experimental Status (Pretest Score), Verbal Intelligence and Non-verbal Intelligence as Covariates in Combination

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Source of Variation			
				Instructional Learning Strategies		Class-room Environ-ment	Instruct-ional Learning Strategies X Classroom Environ-ment
1.	Total sample	100	Knowledge	SS MS df F	170.91 170.91 1 34.45**	17.67 17.67 1 3.56	2.57 2.57 1 0.52
2.		100	Compre-hension	SS MS df F	21.18 21.18 1 3.44	2.96 2.96 1 0.48	4.54 4.54 1 0.74
3		100	Application	SS MS df F	147.60 147.60 1 25.29**	0.05 0.05 1 0.01	0.88 0.88 1 0.15
4		100	Analysis	SS MS df F	0.01 0.01 1 0.01	9.89 9.89 1 1.26	12.51 12.51 1 1.59
5		100	Synthesis	SS MS df F	2.08 2.08 1 3.30	0.47 0.47 1 0.75	4.24 4.24 1 6.73*
6		100	Evaluation	SS MS df F	0.28 0.28 1 0.35	1.78 1.78 1 2.29	3.11 3.11 1 3.99*
7		100	Retention (Total)	SS MS df F	1015.77 1015.77 1 13.89**	98.89 98.89 1 1.35	48.33 48.33 1 0.66

* Significant at 0.05 level.

** Significant at 0.01 level.

After controlling the effect of the three Covariates in combination at a time, the ANCOVA yield significant F-values at 0.01 level (tabled value = 6.90, df: 1, 95) for Instructional Learning Strategies on Retention in Total score and Objectivewise scores in Knowledge and Application. It indicates that, even after a linear adjustment is made to remove the combined effect of the Covariates, there exists **statistically significant** difference between the Experimental and Control groups in terms of their mean Retention in Total and Objectivewise scores in Knowledge and Application.

F-values for the Objectives Comprehension, Analysis, Synthesis and Evaluation are not found significant even at 0.05 level. Hence it can be inferred that there doesn't exist statistically significant difference between the two groups in their mean Retention in these Objectives.

As the main objective of the study is to compare the effectiveness of two Instructional Learning Strategies (CLS and CMT), Classroom Environment is not considered for interpretation in the ANCOVA procedure. It is treated as a ***fixed factor.***

Adjusted Means and Post-hoc Comparison

The adjusted mean scores of Retention in Malayalam Language (Total and Objectivewise namely knowledge and Application) of the Experimental and Control groups were compared using Scheffe' Test of Post-hoc Comparison. This comparison was done with a view to find out the group which created variation in the mean Retention scores. Results of the Scheffe' Test are summarised in Table 4.25.

TABLE 4.25

Results of the Scheffe' Test of Post-hoc Comparison Between the Adjusted Means of Retention in Malayalam Language (Objectivewise and Total score) for Total sample

Sample	N	Dependent Variable	Groups Compared	Adjusted Means		F-value	Values of F'		Level of Significance
				M_1	M_2		0.05	0.01	
Total sample	100	Knowledge	CLS - CMT	8.74	5.75	44.78	3.94	6.90	0.01
	100	Application	CLS - CMT	7.70	4.93	32.84	3.94	6.90	0.01
	100	Retention (Total)	CLS - CMT	30.78	23.52	18.04	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Results of the Scheffe' Test show that, the obtained F-values for the comparisons are 44.78 (Knowledge), 32.84 (Application) and 18.04 (Total score). All of these F-values are significant at 0.01 level as shown in Table 4.25. These results reveal that ***significant difference*** exists between the two groups based on Instructional Learning Strategies (CLS and CMT) in terms of their mean Retention scores (Total and Objectivewise scores in Knowledge and Application). Higher mean Retention scores of the Experimental group (CLS) indicate its ***effectiveness*** of treatment over the Control group (CMT) in the case of Retention scores (Total and Objectivewise scores in Knowledge and Application).

4.2.2.2.e. Summary and Discussion of Analysis of Covariance for Retention

Difference in the mean Retention scores (Objectivewise and Total score) of the Experimental and Control groups, after treatment was studied

by employimg 28 ANCOVA. By this, the investigator further studied the relative effectiveness of Cooperative Learning Strategy and Conventional lecture Method of Teaching on Retention. The results of these 28 ANCOVA are summarised and discussed in this sub-section.

The F-values obtained for the 28 ANCOVA are consolidated and presented in Table 4.26.

TABLE 4.26

Summary of the F-values of ANCOVA for Retention

Sl. No.	Source of Variation	Dependent Variable	Covariates			
			Pre-experi-mental Status (Pretest Score)	Verbal Intelligence	Non-verbal Intelligence	Pre-experimental Status, Verbal Intelligence and Non-verbal Intelligence
			F-values			
1.	Instructional Learning Strategies	Knowledge	26.44**	34.35**	27.96**	34.45**
2.		Comprehension	2.53	4.82*	5.01*	3.44
3.		Application	19.39**	24.86**	23.78**	25.29**
4.		Analysis	0.04	0.16	0.28	0.01
5.		Synthesis	2.88	4.77*	4.92*	3.30
6.		Evaluation	0.21	0.83	0.98	0.35
7.		Retention (Total)	9.69**	14.76**	13.21**	13.89**

* Significant at 0.05 level
** Significant at 0.01 level

As seen in Table 4.26, using three Covariates [Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence] separately and in combination at a time, 28 ANCOVA were employed to

study the difference in the mean Retention scores of the Experimental and Control groups after treatment.

Three ANCOVA yielded significant F-values for Instructional Learning Strategies on Retention (Total and Objectivewise scores namely Knowledge and Application), when the Pre-experimental Status was controlled. It suggests that Experimental and Control groups differ significantly in Achievement (Total, Knowledge, Application) scores after treatment. When the effect of the Verbal Intelligence was controlled, significant difference in Retention (Total and Objectivewise scores except Analysis and Evaluation) between the Experimental and Control groups was occured in ***five*** ANCOVA. Another ***five*** ANCOVA with Non-verbal Intelligence controlled, yielded significant difference in Retention (Total and Objectivewise scores except, Analysis and Evaluation) between the Experimental and Control groups. When the combined effect of the three Covariates was controlled at a time, significant variation between the two groups was occurred in three ANCOVA (Retention - Total and Objectivewise scores in Knowledge and Application).

In the Objectives Analysis and Evaluation, the F-values for Instructional Learning Strategies on Retention were not found significant with any of the Covariates. F-values for the Objectives Comprehension and Synthesis are found significant only with the single effect of the two Covariates, Verbal Intelligence and Non-verbal Intelligence.

In short, 16 out of 28 ANCOVA employed, yielded significant difference in Retention (relevant Objectives and Total score) between the Experimental and Control groups. These results and the results of the Post-

hoc Comparison done after ANCOVA revealed the fact that, ***Cooperative Learning Strategy*** (Experimental treatment) has advantage over the Conventional lecture Method (Control treatment) in terms of the power of Retention.

4.2.3. ANALYSIS OF VARIANCE FOR ACHIEVEMENT AND RETENTION

To comply with the second major objective of the study, the investigator employed ***Two-way ANOVA*** with 2 x 2 Factorial design to study the main and interaction effects of ***Insturctional Learning Strategies*** and ***Classroom Environment*** on ***Achievement and Retention*** in Malayalam Language as measured through an Achievement test. The Analysis was done separately for the Total sample, Boys and Girls.

Two-way ANOVA with 2 x 2 Factorial design includes two levels of Instructional Learning Strategies (***Cooperative Learning Strategy*** and ***Conventional lecture Method of Teaching***) and Two levels of Classroom Environment (***Above Average Classroom Environment*** and ***Below Average Classroom Environment***). The entire computational process was carried out using the computer program Statistical Package for Social Sciences - SPSS (Hull & Nie, 1981). The program for unequal number was used for processing the data due to the unequal number of cases in the treatment cells. The analysis comprised of 42 ANOVA, of which 21 were used to study the main and interaction effects of ***Instructional Learning Strategies*** and ***Classroom Environment*** on ***Achievement*** in Malayalam Language (Objectivewise and Total score) for Total sample, Boys and Girls. The remaining 21 ANOVA were used to study the main and interaction effects

of ***Instructional Learning Strategies*** and ***Classroom Environment*** on ***Retention*** in Malayalam Language (Objectivewise and Total score) for Total sample, Boys and Girls.

Before proceeding to ANOVA, the investigator made sure that the major assumptions of ANOVA suggested by Scheffe' (1959), Hays (1973), Guilford and Fruchter (1978) and Fox (1984) have been reasonably satisfied. The classificatory technique for the 2 x 2 ANOVA was the same that used for the 2 x 2 ANCOVA (see section 4.2.2.). Scheffe' Test of Post-hoc Comparison was done after every ANOVA which showed significant F-values for the main effect of the Independent Variables. This was done to find out the particular group of the Independent Variables which differentiated the Experimental and Control groups in terms of the Dependent Variables.

4.2.3.1. ANALYSIS OF VARIANCE FOR ACHIEVEMENT

This part of the chapter is devoted to present the results of 21 Two-way ANOVA (seven ANOVA each in three sample - Total sample, Boys and Girls) undertaken to study whether the Dependent Variable, Achievement in Malayalam Language varies or not, when the levels of the Independent Variables change in Total sample, Boys and Girls.

By Two-way ANOVA, it is possible to get an answer to the question whether variation in Achievement is attributable to the changes in the levels of the Independent Variables singly or in combination. The main effects and two-way interaction effect of the Instructional Learning Strategies and Classroom Environment on Achievement were examined. The results are interpreted in the following section.

4.2.3.1.a. Main and Interaction Effects of Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) - Total sample

Seven Two-way ANOVA were employed for the Total sample, to find out the main and interaction effects of the Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) as measured through a Post test. Summary of the Two-way ANOVA for Total sample is given in Table 4.27.

TABLE 4.27

Summary of Two-way ANOVA for Achievement (Objectivewise and Total score) by Instructional Learning Strategies by Classroom Environment for Total sample

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Main Effect of Instructional Learning Strategies		Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1	Total sample	100	Knowledge	SS MS df F	270.482 270.482 1 21.28**	0.248 0.248 1 0.020	15.582 15.582 1 1.226
2		100	Compre-hension	SS MS df F	38.93 38.93 1 2.566	2.641 2.641 1 0.174	19.469 19.469 1 1.284
3.		100	Application	SS MS df F	175.654 175.754 1 13.89**	6.905 6.905 1 0.546	32.705 32.705 1 2.586
4.		100	Analysis	SS MS df F	23.792 23.792 1 1.646	0.053 0.053 1 0.004	26.314 26.314 1 1.82
5.		100	Synthesis	SS MS df F	12.932 12.932 1 7.12**	0.079 0.079 1 0.043	0.001 0.001 1 0.004
6.		100	Evaluation	SS MS df F	8.017 8.017 1 3.928	0.056 0.056 1 0.028	1.946 1.946 1 0.954
7.		100	Achievement (Total)	SS MS df F	2232.039 2232.039 1 9.50**	0.476 0.476 1 0.002	427.842 427.842 1 1.821

* Significant at 0.05 level

** Significant at 0.01 level

Main Effect of Instructional Learning Strategies

Table 4.27 shows that the obtained F-values for the main effect of Instructional Learning Strategies on Total and Objectivewise Achievement in Knowledge, Application and Synthesis are 9.50, 21.28, 13.89 and 7.12 respectively. These values are above the tabled value (6.90) for 1,96 df at 0.01 level of significance. Hence the main effect of Instructional Learning Strategies on Achievement in Malayalam Language is significant for the Total score and Objectivewise scores in Knowledge, Application and Synthesis. It indicates that Achievement in Malayalam Language (Total and Objectives mentioned earlier) of standard VII pupils are ***depended*** upon the changes in the Instructional Learning Strategies.

Table 4.27 also shows that the F-values for the main effect of Instructional Learning Strategies on the Objectivewise Achievement in Comprehension (2.566), Analysis (1.646), and Evaluation (3.928) are not significant even at 0.05 level (tabled value = 3.94, df: 1, 96). It indicates that for Total sample, Achievement in these Objectives are not depended upon the changes in the Instructional Learning Strategies.

Main Effect of Classroom Environment

It can also be seen from Table 4.27 that the obtained F-values for the main effect of Classroom Environment on Achievement in Malayalam Language (Total and all Objectives) are far below the tabled value set for 0.05 level of significance (3.94, df : 1, 96). Therefore the main effect of Classroom Environment on Achievement in Malayalam Language (Total and all Objectives) is ***not significant.*** It indicates that Achievement in

Malayalam Language (Total score and all Objectives) is ***independent*** of the changes in the levels of Classroom Environment of standard VII pupils.

Interaction Effect of Instructional Learning Strategies and Classroom Environment

No significant F-ratios were observed for the interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score). All F-ratios are found below the tabled value (3.94, df:1,96) set for 0.05 level of significance. This indicates that Achievement in Malayalam Language of standard VII pupils is independent of the combined effect of Instructional Learning Strategies and Classroom Environment.

Graphical Representation of the Interaction Effect

The investigator made an attempt to study the pattern of interaction graphically. For this, the mean scores of the Dependent Variable, Achievement in Malayalam Language (Objectivewise and Total score) were plotted in the ***Ordinate*** of the graph and the two levels of Classroom Environment (AACE and BACE) as ***abscissa***. Instructional Learning Strategies (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT) are represented by ***lines*** on the graph.

The graphical pattern of the interaction effect is presented in Figure 4-11.

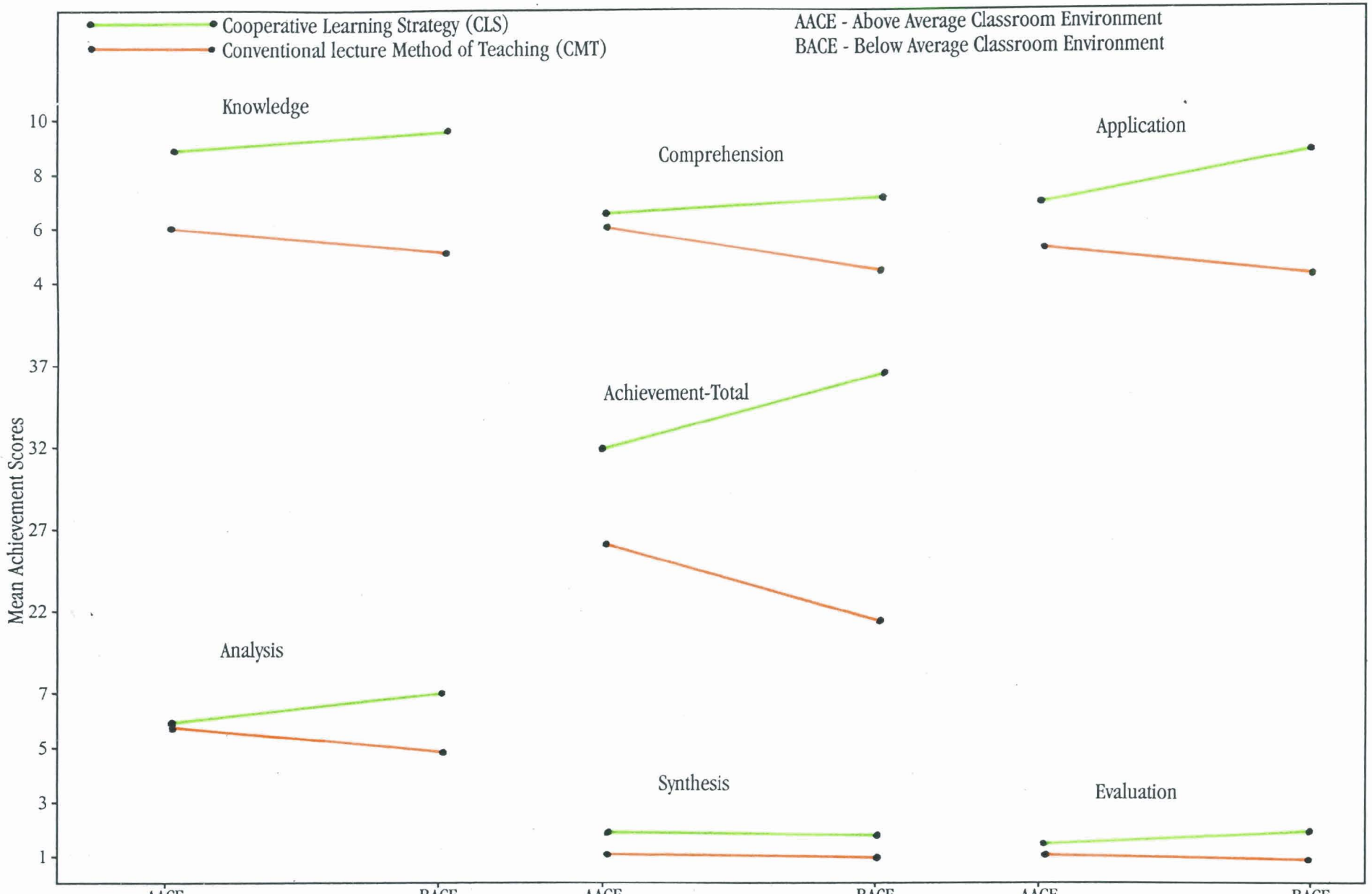


FIGURE 4-11 Interaction Pattern of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) - Total sample

A general trend in the interaction pattern shows that the BACE group which was taught through the Cooperative Learning Strategy (CLS) yields the highest mean Achievement scores. That is, Cooperative Learning Strategy is seen more ***favourable*** to the BACE group than the AACE group.

Scheffe' Test of Post-hoc Comparison

As some significant F-values were obtained for the main effect of Instructional Learning Strategies on Achievement, the mean Achievement scores (Objectivewise and Total score) of the two groups based on Instructional Learning Strategies (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT) were compared to study the group difference. Scheffe' Test of Post-hoc Comparison was used for this purpose. Thus the investigator was able to identify the group that possessed higher Achievement.

The procedure of the Scheffe' Test has already been described in the ANCOVA section (see section 4.2.2.1).

The F-ratios were computed between the criterion means (Achievement - Total and Objectivewise scores whichever relevant) of the two groups (Cooperative Learning Strategy and Conventional lecture Method of Teaching). Details of the Scheffe' Test of Post-hoc Comparison are presented in Table 4.28.

TABLE 4.28

Results of the Scheffe' Test of Post-hoc Comparison Between the Means of Achievement (Objectivewise and Total score) for Total sample Based on Two Groups of Instructional Learning Strategies

Sample	Dependent Variable	Groups Compared	Means		Number of Students		F-value	Values of F'		Level of Significance
			M_1	M_2	N_1	N_2		0.05	0.01	
Total sample	Knowledge	CLS - CMT	9.28	5.4	50	50	29.61	3.94	6.90	0.01
	Application	CLS - CMT	7.74	4.82	50	50	16.86	3.94	6.90	0.01
	Synthesis	CLS - CMT	2.14	1.30	50	50	9.71	3.94	6.90	0.01
	Achievement (Total)	CLS - CMT	34.36	23.12	50	50	13.44	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As per Table 4.28, the F-ratios obtained for the comparison of the mean Achievement [Total score (13.44) and Objetivewise scores in Knowledge (29.61), Application (16.86) and Synthesis (9.71)] are found significant at 0.01 level as they exceed the value of F' (6.90, df: 1, 98). These results suggest that for the Total sample, ***significant difference*** occurs between the two groups (CLS and CMT) with regard to the mean Achievement scores (Total and Objectives mentioned earlier).

It can be noted that in all of these comparisons high mean Achievement scores are seen to associate with the ***Experimental group to which Cooperative Learning Strategy*** was used. It approved the fact that, pupils taught through Cooperative Learning Strategy (CLS) ***achieved more*** than pupils taught through Conventional lecture Method of Teaching.

Since no significant F-values were obtained for the main effect of Classroom Environment, comparison between the two levels of Classroom Environment (AACE and BACE) has been avoided.

4.2.3.1.b. Main and Interaction Effects of Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) – Boys

Two-way ANOVA was used to study the main and interaction effects of Instructional Learning Strategies (Cooperative Learning Strategy and Conventional lecture Method of Teaching) and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) of Boys.

Summary of the Two-way ANOVA for Boys is given in Table 4.29.

TABLE 4.29

Summary of Two-way ANOVA for Achievement (Objectivewise and Total score) by Instructional Learning Strategies by Classroom Environment for Boys

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Main Effect of Instructional Learning Strategies		Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1	Boys	51	Knowledge	SS MS df F	158.912 158.912 1 8.47**	0.140 0.140 1 0.007	8.439 8.439 1 0.450
2		51	Compre-hension	SS MS df F	25.904 25.904 1 1.184	2.577 2.577 1 0.118	5.238 5.238 1 0.239
3.		51	Application	SS MS df F	109.937 109.937 1 6.65*	4.937 4.937 1 0.299	17.070 17.070 1 1.033
4.		51	Analysis	SS MS df F	28.661 28.661 1 1.769	5.280 5.280 1 0.326	23.769 23.769 1 1.467
5.		51	Synthesis	SS MS df F	6.366 6.366 1 3.275	0.233 0.233 1 0.120	0.558 0.558 1 0.287
6.		51	Evaluation	SS MS df F	6.064 6.064 1 2.538	0.005 0.005 1 0.002	0.794 0.794 1 0.332
7.		51	Achieve-ment (Total)	SS MS df F	1483.779 1483.779 1 4.39*	47.76 47.76 1 0.141	250.863 250.863 1 0.742

* Significant at 0.05 level

** Significant at 0.01 level

Main Effect of Instructional Learning Strategies

Table 4.29 shows that for Boys, the obtained F-values for the main effect of Instructional Learning Strategies on Achievement in the Objective Knowledge (8.47) is above the tabled value (7.19, df: 1,47) set for 0.01 level of significance. The F-values for the Total score and the Objectivewise score in Application are 4.39 and 6.65 respectively. These values are found significant at 0.05 level (tabled value = 4.04, df: 1, 47). Hence the main effect of Instructional Learning Strategies on Achievement is ***significant*** for the Total score and for the Objectives Knowledge and Application. It indicates that Achievement (Total score and Objectives namely Knowledge and Application) changes with the change in the Instructional Learning Strategies.

No significant F-values are obtained for the remaining Objectives Comprehension (1.184), Analysis (1.769), Synthesis (3.275) and Evaluation (2.538), even at 0.05 level (tabled value = 4.04, df: 1, 47). It shows that Achievement in these Objectives do not vary with the change in the Instructional Learning Strategies.

Main Effect of Classroom Environment

The obtained F-values for the main effect of Classroom Environment on Achievement (Objectivewise and Total score) of standard VII Boys are found far below the tabled value set for 0.05 level of significance (4.04, df:1,47). It reveals that, Achievement (Objectivewise and Total score) of standard VII Boys is ***not depended*** upon the change in the levels of Classroom Environment.

Interaction Effect of Instructional Learning Strategies and Classroom Environment

Interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) is ***not significant*** as the F-values are found far below the tabled value (4.04) for 1,47 df at 0.05 level of significance. It indicates that Achievement in Malayalam Language (Objectivewise and Total score) of standard VII Boys is ***independent*** of the combined effect of Instructional Learning Strategies and Classroom Environment.

Graphical Representation of the Interaction Effect

For examining the interaction effect graphically the mean scores of the Dependent Variable, Achievement in Malayalam Language (Objectivewise and Total score) were plotted in the ***ordinate*** of the graph and the two levels of Classroom Environment, AACE and BACE as ***abscissa***. Instructional Learning Strategies (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT) were represented by ***lines*** on the graph.

The graphical representation is given in Figure 4-12.

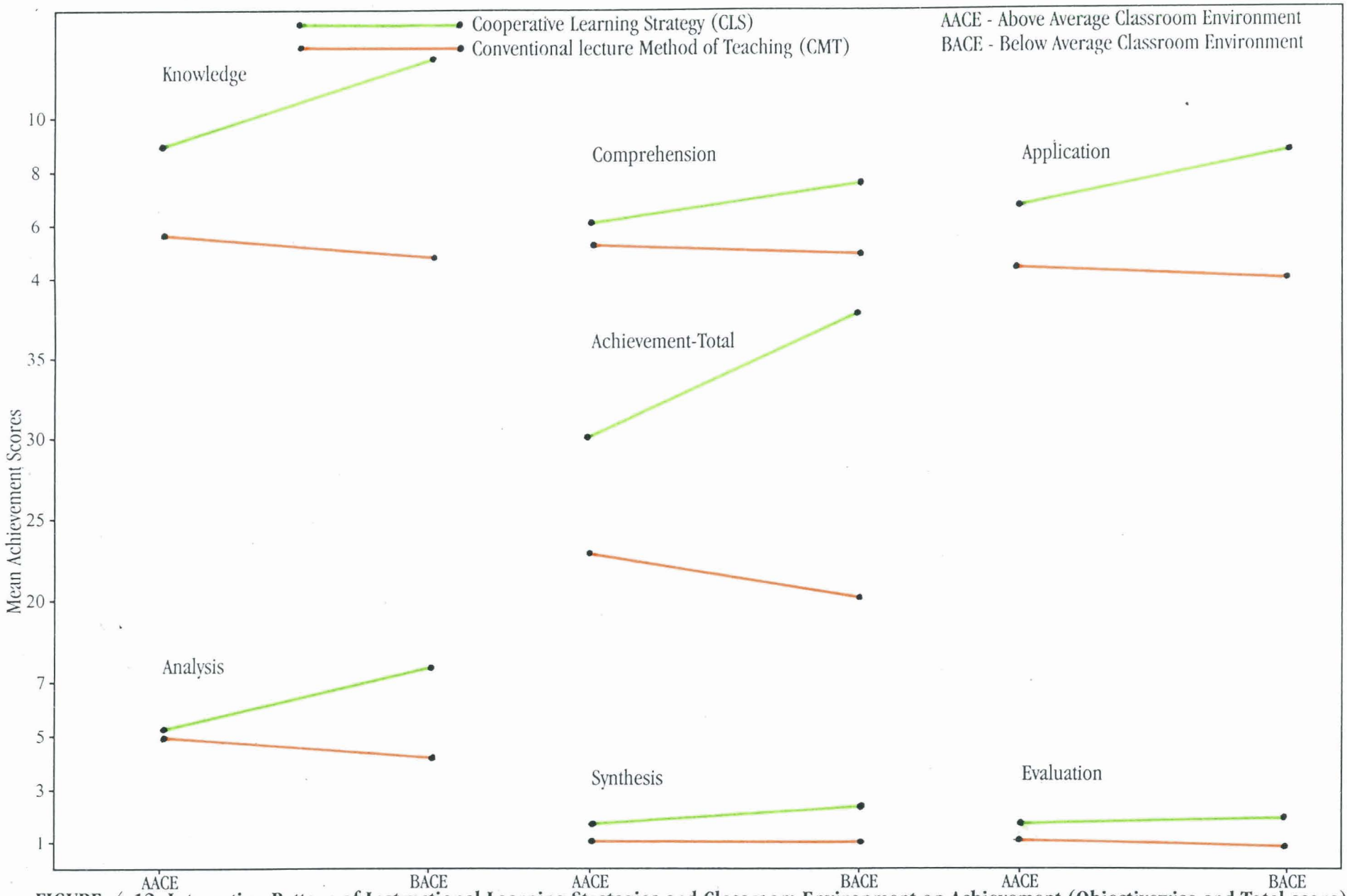


FIGURE 4-12 Interaction Pattern of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) - Boys

As Figure 4-12 shows, Cooperative Learning Strategy (CLS) is ***more favourable*** for the Boys as it created high mean Achievement scores when compared to the Conventional lecture Method of Teaching (CMT). Moreover, the BACE group of Boys shows higher Achievement with CLS than the AACE group. The general trend in the pattern indicates that Cooperative Learning Strategy is ***more beneficial*** to the BACE group than the AACE group.

Scheffe' Test of Post-hoc Comparison

The 2 x 2 ANOVA for Achievement, employed for the Boys yielded significant main effect for Instructional Learning Strategies on Total and Objectivewise Achievement in Knowledge and Application. To examine which level of Instructional Learning Strategies (CLS or CMT) caused variation in Achievement, Scheffe' Test of Post-hoc Comparison was used. The mean Achievement scores of Boys in the two groups (CLS and CMT) were compared in the Scheffe' Test. Data and Results of the Scheffe' Test of Post-hoc Comparison are presented in Table 4.30.

TABLE 4.30

Results of the Scheffe' Test of Post-hoc Comparison Between the Means of Achievement (Objectivewise and Total score) for Boys Based on Two Groups of Instructional Learning Strategies

Sample	Dependent Variable	Groups Compared	Means		Number of Students		F-value	Values of F'		Level of Significance
			M_1	M_2	N_1	N_2		0.05	0.01	
Boys	Knowledge	CLS - CMT	9.20	5.19	20	31	10.40	4.03	7.17	0.01
	Application	CLS - CMT	7.25	4.23	20	31	6.73	4.03	7.17	0.01
	Achievement (Total)	CLS - CMT	32.45	21.16	20	31	4.58	4.03	7.17	0.05

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Table 4.30 reveals that the F-ratios obtained for Achievement in Knowledge (10.40) and Application (6.73) are significant at 0.01 level and in the Total score (4.58), the F-ratio is significant at 0.05 level as they exceed the corresponding values of F' (7.17 and 4.03, df:1,49). It can be inferred from these results that, for Boys, there exists ***statistically significant difference*** between the two groups (CLS and CMT) in terms of the mean Achievement in Total score and Objectivewise scores mentioned earlier.

High mean scores associated with the Experimental group (CLS) prove its ***advantage*** over the Control group (CMT).

4.2.3.1.c. Main and Interaction Effects of Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) - Girls

Data and results of seven ANOVA employed to study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) of Girls are presented in Table 4.31.

TABLE 4.31

Summary of Two-way ANOVA for Achievement (Objectivewise and Total score) by Instructional Learning Strategies by Classroom Environment for Girls

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Main Effect of Instructional Learning Strategies		Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1	Girls	49	Knowledge	SS MS df F	127.347 127.347 1 17.32**	5.274 5.274 1 0.717	1.981 1.981 1 0.269
2		49	Compre-hension	SS MS df F	21.399 21.399 1 2.259	0.456 0.456 1 0.048	10.411 10.411 1 1.099
3.		49	Application	SS MS df F	60.375 60.375 1 7.05*	16.668 16.668 1 1.946	8.977 8.977 1 1.048
4.		49	Analysis	SS MS df F	3.678 3.678 1 0.301	5.198 5.198 1 0.425	0.719 0.719 1 0.059
5.		49	Synthesis	SS MS df F	8.064 8.064 1 4.68*	0.747 0.747 1 0.433	1.235 1.235 1 0.716
6.		49	Evaluation	SS MS df F	3.553 3.553 1 2.039	3.309 3.309 1 1.899	0.057 0.057 1 0.033
7.		49	Achievement (Total)	SS MS df F	919.502 919.502 1 6.74*	113.795 113.795 1 0.834	57.844 57.844 1 0.424

* Significant at 0.05 level

** Significant at 0.01 level

Main Effect of Instructional Learning Strategies

As Table 4.31 shows, 2 x 2 ANOVA yield significant F-values for the main effect of Instructional Learning Strategies on Achievement in the Total score and Objectivewise scores in Knowledge, Application and Synthesis. For the Objective Knowledge the F-value (F=17.32) is found above the tabled value (7.23) for 1,45 df (P<0.01). For the Total score and the Objectives namely Application and Synthesis, the F-values are 6.74, 7.05 and 4.68 respectively. These values are significant at 0.05 level (tabled value = 4.06, df: 1, 45). These results indicate that the change in the Instructional Learning Strategies ***affects Achievement*** (Total and Objectives mentioned earlier). F-values obtained for the Objectives Comprehension (2.259), Analysis (0.301) and Evaluation (2.039) are found below the tabled value (4.06) for 1, 45 df, at 0.05 level. It indicates that Achievement in these Objectives are not depended upon the change in the Instructional Learning Strategies.

Main Effect of Classroom Environment

The main effect of Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) of Girls were studied. The obtained F-values are found far below the tabled value (4.06) for 1,45 df, at 0.05 level of significance as shown in Table 4.31. It proves that change in the levels of Classroom Environment ***does not affect*** Achievement (Objectivewise and Total score) in Malayalam Language of Girls.

Interaction Effect of Instructional Learning Strategies and Classroom Environment

As Table 4.31 shows, none of the F-values obtained for the interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) are significant even at 0.05 level (tabled value = 4.06, df: 1, 45). It shows that Achievement in Malayalam Language (Objectivewise and Total score) ***has not been affected*** by the combined effect of Instructional Learning Strategies x Classroom Environment.

Graphical Representation of the Interaction Effect

The interaction effect has been represented graphically by plotting the mean scores of Achievement (Objectivewise and Total score) in the ***ordinate*** of the graph and the two levels of Classroom Environment, AACE and BACE as the ***abscissa***. Instructional Learning Strategies (CLS and CMT) are represented by ***lines*** on the graph. The graphical pattern of interaction in the case of Girls is presented in Figure 4-13.

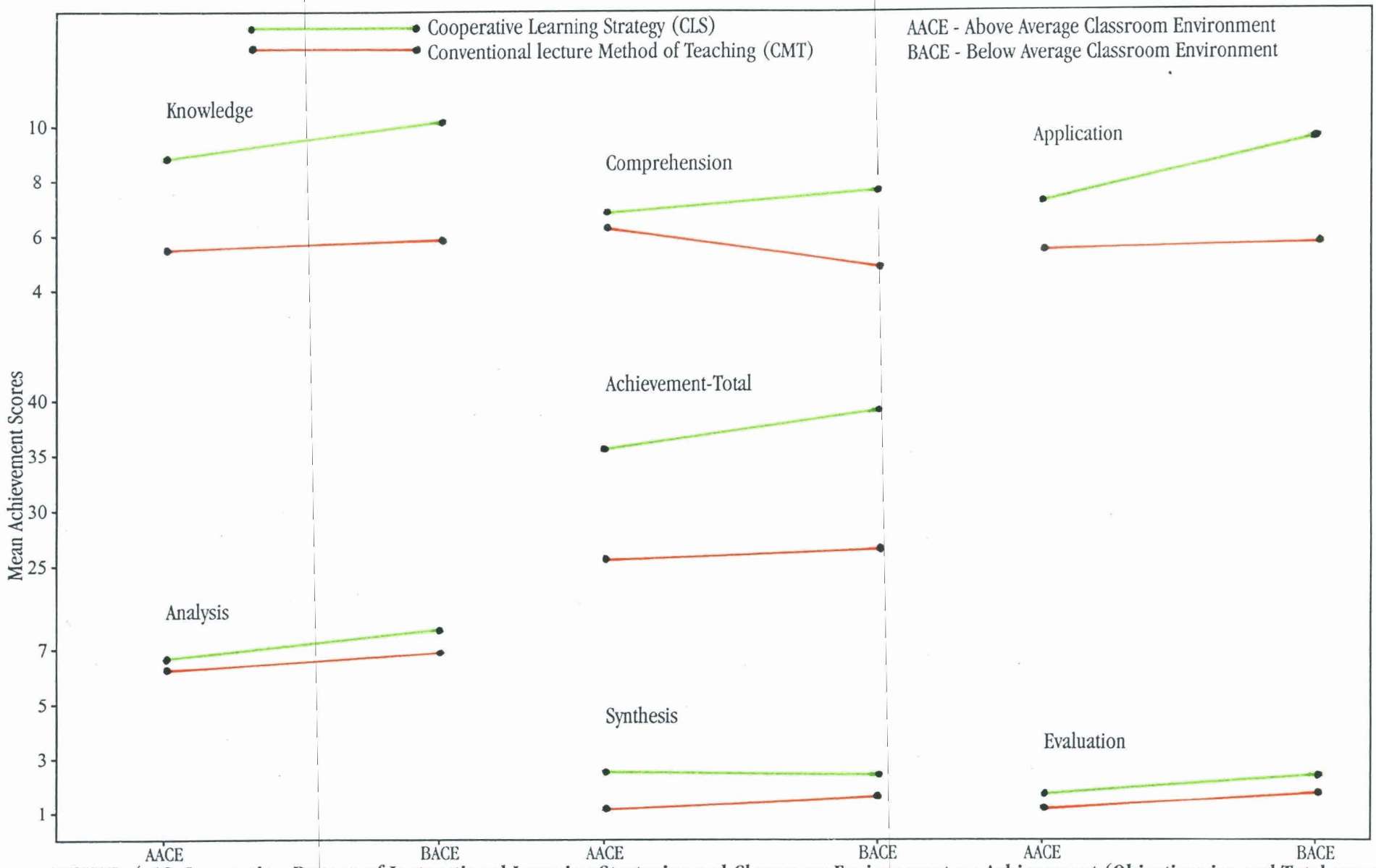


FIGURE 4-13 Interaction Pattern of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) - Girls

As shown in Figure 4-13, Girls of the BACE group favour Cooperative Learning Strategy (CLS) as evidenced from their high mean Achievement scores (Total and Objectivewise except Synthesis). For the Objective Synthesis the AACE shows higher Achievement with CLS than the BACE. However, the general trend in the interaction reveals that the BACE group ***achieved more*** with Cooperative Learning Strategy than the AACE group.

Scheffe' Test of Post-hoc Comparison

Significant main effect of Instructional Learning Strategies on Achievement (Total and Objectivewise scores in Knowledge, Application and Synthesis) was found in the 2 x 2 ANOVA. Hence to study the group difference, Scheffe' Test of Post-hoc Comparison was used. The mean Achievement scores of the two groups based on Instructional Learning Strategies (CLS and CMT) were compared in the Scheffe' Test. Details of the Scheffe' Test of Post-hoc Comparison for Girls are presented in Table 4.32.

TABLE 4.32

Results of the Scheffe' Test of Post-hoc Comparison Between the Means of Achievement (Objectivewise and Total score) for Girls Based on Two Groups of Instructional Learning Strategies

Sample	Dependent Variable	Groups Compared	Means		Number of Students		F-value	Values of F'		Level of Significance
			M_1	M_2	N_1	N_2		0.05	0.01	
Girls	Knowledge	CLS - CMT	9.333	5.737	30	19	20.46	4.04	7.19	0.01
	Application	CLS - CMT	8.067	5.789	30	19	7.05	4.04	7.19	0.05
	Synthesis	CLS - CMT	2.30	1.526	30	19	4.04	4.04	7.19	0.05
	Achievement (Total)	CLS - CMT	35.633	26.316	30	19	7.40	4.04	7.19	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As Table 4.32 shows, the F-ratios obtained for Instructional Learning Strategies on Total Achievement (7.40) and on the Objective Knowledge (20.46) are significant at 0.01 level. For the Objectives Application (7.05) and Synthesis (4.04) the F-ratios are found significant at 0.05 level. Because all of these F-values are seen beyond the corresponding values of F' (7.19 and 4.04, df:1, 47) at 0.01 and 0.05 levels. Hence ***significant difference*** exists between the two groups (CLS and CMT) with regard to the mean Achievement scores mentioned earlier. High mean scores associated with the Experimental group (CLS) prove its ***superiority*** over the Control group (CMT).

4.2.3.1.d. Summary and Discussion of Analysis of Variance for Achievement

The results of 21 ANOVA (seven each in Total sample, Boys and Girls) helped the investigator to examine whether changes in Achievement (Objectivewise and Total score) are attributable to the changes in the levels of Instructional Learning Strategies and Classroom Environment or not. The F-values obtained in the 21 ANOVA for Achievement are summarised, presented in Table 4.33 and discussed in this sub-section.

TABLE 4.33

Summary of ANOVA for Achievement (Objectivewise and Total score) for Total sample, Boys and Girls

Sl. No.	Sample	Dependent Variable	F-values		
			Main Effect of Instructional Learning Strategies	Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1.	Total	Knowledge	21.28**	0.020	1.226
2.		Comprehension	2.566	0.174	1.284
3.		Application	13.89**	0.546	2.586
4.		Analysis	1.646	0.004	1.82
5.		Synthesis	7.12**	0.043	0.004
6.		Evaluation	3.928	0.028	0.954
7.		Achievement (Total)	9.50**	0.002	1.821
8.	Boys	Knowledge	8.47**	0.007	0.450
9		Comprehension	1.184	0.118	0.239
10.		Application	6.65*	0.299	1.033
11.		Analysis	1.769	0.326	1.467
12.		Synthesis	3.275	0.120	0.287
13.		Evaluation	2.538	0.002	0.332
14.		Achievement (Total)	4.39*	0.141	0.742
15.	Girls	Knowledge	17.32**	0.717	0.269
16.		Comprehension	2.259	0.048	1.099
17.		Application	7.05*	1.946	1.048
18.		Analysis	0.301	0.425	0.059
19.		Synthesis	4.68*	0.433	0.716
20.		Evaluation	2.039	1.899	0.033
21.		Achievement (Total)	6.74*	0.834	0.424

* Significant at 0.05 level

** Significant at 0.01 level

A thorough examination of the results of the 21 ANOVA conducted to study the main and interaction effects of Instructional Learning Strategies on Achievement in Malayalam Language (Objectivewise and Total score) reveals that ***four*** ANOVA show significant main effect of Instructional Learning Strategies on Achievement (Total and Objectivewise namely Knowledge, Application and Synthesis) for Total sample. Three ANOVA show significant main effect of Instructional Learning Strategies on Achievement (Total and Objectivewise namely, Knowledge and Application) for Boys. In Girls ***four*** ANOVA yield significant main effect of Instructional Learning Strategies on Achievement (Total and Objectivewise namely Knowledge, Application and Synthesis). Altogether in ***11*** ANOVA, ***significant main effect of Instructional Learning Strategies on Achievement in Malayalam Language is observed.*** These results indicates that Instructional Learning Strategies have ***considerable influence on Achievement in Malayalam Language*** (Total and Objectivewise mentioned earlier) for Total sample, Boys and Girls.

None out of the 21 ANOVA, show significant main effect of Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) for Total sample, Boys and Girls. It indicates that Achievement (Objectivewise and Total score) of Total sample, Boys and Girls are ***not depended upon the changes in the levels of Classroom Environment.***

No significant interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement in Malayalam Language (Objectivewise and Total score) is observed for Total sample, Boys and

Girls. It proves that variation in Achievement (Objectivewise and Total score) of Total sample, Boys and Girls are ***not attributable to the combined effect of the Instructional Learning Strategies and Classroom Environment.***

The interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) was studied graphically for the Total sample, Boys and Girls. A general trend revealed from these graphical representations was that, the ***Cooperative Learning Strategy was more beneficial to the BACE*** (Below Average Classroom Environment) ***group than the AACE*** (Above Average Classroom Environment) ***group.***

4.2.3.2. ANALYSIS OF VARIANCE FOR RETENTION

Retention is the remaining impression of past experience or learning. In the present study Retention was measured through a test conducted one month after the treatment was over. This section of analysis is intended to examine whether the Instructional Learning Strategies and Classroom Environment have any influence (separately and in combination) on student Retention or not. Results of the Two-way ANOVA employed for this purpose are presented and discussed as follows.

4.2.3.2.a. Main and Interaction Effects of Instructional Learning Strategies and Classroom Environment on Retention in Malayalam Language (Objectivewise and Total score) – Total sample

By this sub-section, it is intended to describe how do the changes in the Independent Variables influence the Retention of the Total sample.

Main and interaction effects of Instructional Learning Strategies and Classroom Environment on Retention in Malayalam Language (Objectivewise and Total score) were examined by Two-way Analysis of Variance.

Summary of the Two-way ANOVA for Retention in Total sample is presented in Table 4.34.

TABLE 4.34

Summary of Two-way ANOVA for Retention (Objectivewise and Total score) by Instructional Learning Strategies by Classroom Environment for Total sample

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Main Effect of Instructional Learning Strategies		Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1	Total sample	100	Knowledge	SS MS df F	255.899 255.899 1 19.22**	1.697 1.697 1 0.127	8.081 8.081 1 0.607
2		100	Compre-hension	SS MS df F	49.603 49.603 1 4.19*	0.708 0.708 1 0.060	36.879 36.879 1 3.116
3.		100	Application	SS MS df F	228.277 228.277 1 15.85**	8.154 8.154 1 0.566	15.369 15.369 1 1.067
4.		100	Analysis	SS MS df F	5.530 5.530 1 0.40	0.482 0.482 1 0.035	59.778 59.778 1 4.312*
5.		100	Synthesis	SS MS df F	4.458 4.458 1 4.57*	1.912 1.912 1 1.960	9.036 9.036 1 9.259**
6.		100	Evaluation	SS MS df F	1.178 1.178 1 1.100	0.631 0.631 1 0.589	6.424 6.424 1 5.997*
7.		100	Retention (Total)	SS MS df F	1909.442 1909.442 1 8.95**	5.239 5.239 1 0.025	681.629 681.629 1 3.194

* Significant at 0.05 level

** Significant at 0.01 level

Main Effect of Instructional Learning Strategies

As per Table 4.34 significant F-values are observed for the main effect of Instructional Learning Strategies on Retention - Total (8.95) and Objectivewise Retention namely Knowledge (19.22) and Application (15.85). These values are above the tabled value (6.90) for 1,96 df, at 0.01 level of significance. For the Objectives Comprehension (4.19) and Synthesis (4.57), the F-values are found significant at 0.05 level (tabled value = 3.94, df: 1, 96). Thus for Total sample, Retention (Total and Objectivewise mentioned earlier) ***is depended upon the change in the Instructional Learning Strategies.*** The F-values for the Objectives Analysis and Evaluation are not found significant even at 0.05 level (tabled value = 3.94, df: 1, 96). It reveals that for these Objectives, Retention is ***not depended upon the change in the Instructional Learning Strategies.***

Main Effect of Classroom Environment

The F-values for the main effect of Classroom Environment on Retention (Objectivewise and Total score) are ***not found significant even at 0.05 level*** (tabled value = 3.94, df: 1, 96). It indicates the fact that change in the levels of Classroom Environment hasn't affected the Retention (Objectivewise and Total score) of the Total sample.

Interaction Effect of Instructional Learning Strategies and Classroom Environment

For the Total sample, F-value for the interaction effect of Instructional Learning Strategies and Classroom Environment on Retention is found significant at 0.01 level, for the Objective Synthesis (9.259) only (tabled

value = 6.90, df: 1, 96); for the Objectives Analysis (4.312) and Evaluation (5.997), the F-values are found significant at 0.05 level (tabled value = 3.94, df: 1, 96). It gives ***evidence*** for the combined effect of Instructional Learning Strategies x Classroom Environment on Retention of the Total sample.

F-values for Total Retention and all other Objectives are not found significant even at 0.05 level (tabled value = 3.94, df: 1, 96). It shows that Retention in Total score and in these Objectives is ***independent*** of the combined effect of the Instructional Learning Strategies and Classroom Environment.

Graphical Representation of the Interaction Effect

Graphical pattern of the interaction effect was made by plotting the mean scores of Retention (Objectivewise and Total score) in the ***ordinate*** of the graph and the two levels of Classroom Environment (AACE and BACE) as the ***abscissa***. Instructional Learning Strategies (CLS and CMT) are represented by ***lines*** on the graph. The graphical pattern of interaction (for Total sample) is shown in Figure 4-14.

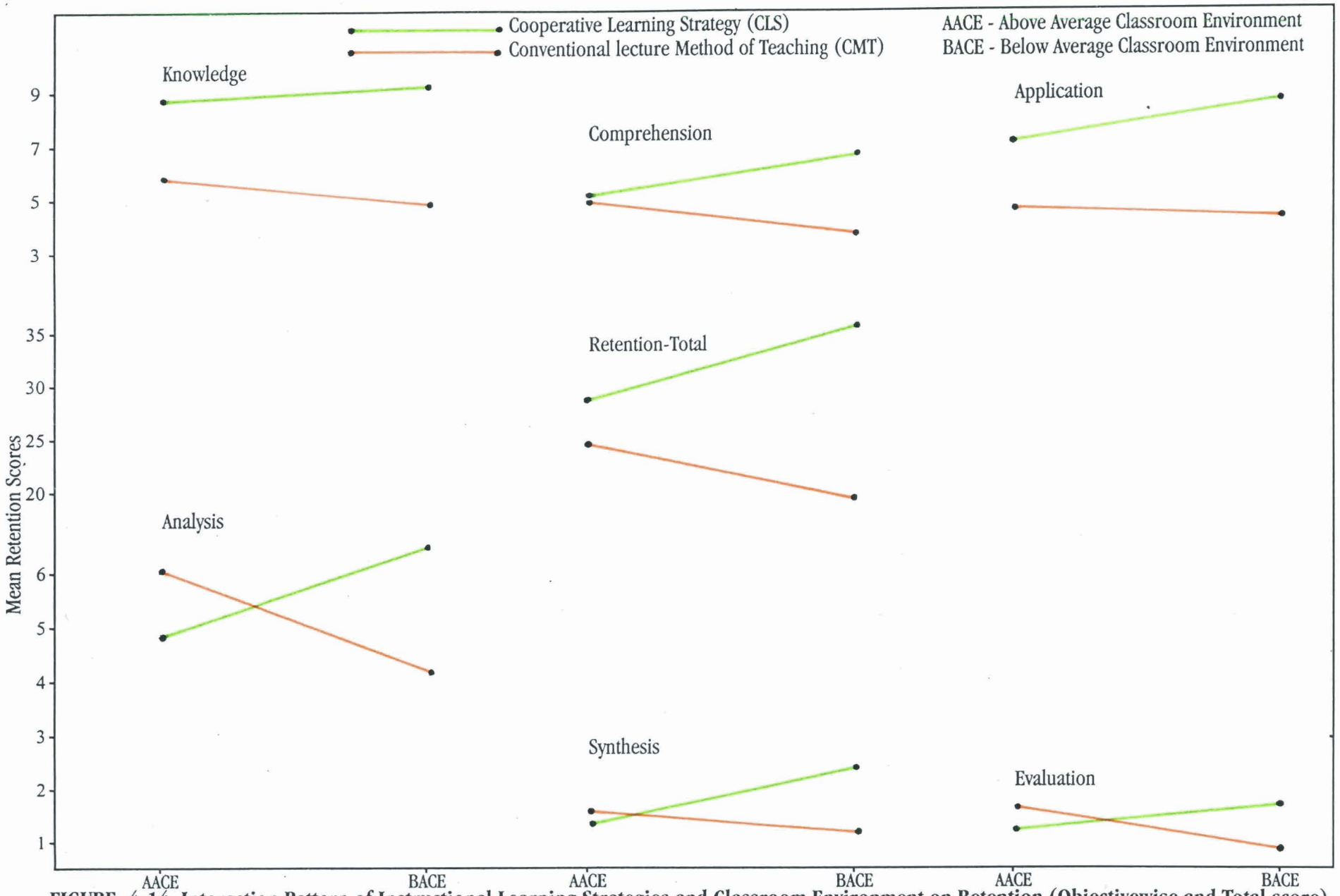


FIGURE 4-14 Interaction Pattern of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) - Total sample.

A close examination of Figure 4-14 reveals that the BACE group of the Total sample shows ***higher mean*** Retention scores with Cooperative Learning Strategy (CLS) for Total Retention and for the Objectives Knowledge, Comprehension and Application. For the Objectives Analysis, Synthesis and Evaluation, clear interaction is seen in which the AACE group shows ***higher*** mean Retention with CMT and the BACE group shows higher mean Retention with CLS. These interactions have been found significant in the ANOVA.

Scheffe' Test of Post-hoc Comparison

Significant main effect of Instructional Learning Strategies on Retention – Total and Objectivewise scores in Knowledge, Comprehension, Application and Synthesis, were obtained in the 2 x 2 ANOVA. Hence comparison of mean Retention scores between the two groups based on Instructional Learning Strategies (CLS and CMT) was attempted. Scheffe' Test of Post-hoc Comparison was used for this purpose.

Data and results of the Scheffe' Test for the Total sample are presented in Table 4.35.

TABLE 4.35

Results of the Scheffe' Test of Post-hoc Comparison Between the Means of Retention (Objectivewise and Total score) for Total sample Based on Two Groups of Instructional Learning Strategies

Sample	Dependent Variable	Groups Compared	Means		Number of Students		F-value	Values of F'		Level of Significance
			M_1	M_2	N_1	N_2		0.05	0.01	
Total sample	Knowledge	CLS - CMT	9.00	5.18	50	50	27.39	3.94	6.90	0.01
	Comprehension	CLS - CMT	5.78	4.08	50	50	6.10	3.94	6.90	0.05
	Application	CLS - CMT	7.80	4.54	50	50	18.44	3.94	6.90	0.01
	Synthesis	CLS - CMT	1.70	1.26	50	50	4.96	3.94	6.90	0.05
	Retention (Total)	CLS - CMT	31.18	20.72	50	50	12.82	3.94	6.90	0.01

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Table 4.35 shows that, for the Total sample, F-ratios obtained for Instructional Learning Strategies on Retention - Total (12.82) and for the Objectives Knowledge (27.39) and Application (18.44) are significant at 0.01 level. F-values for Comprehension (6.10) and Synthesis (4.96) are found significant at 0.05 level, as these values exceed the corresponding values of F' (6.90 and 3.94, df:1, 98). Hence it can be noticed a ***significant difference*** between the two groups based on Instructional Learning Strategies (CLS and CMT) in terms of the mean Retention scores. The treatment in the Experimental group (CLS) is seen ***more effective*** than the treatment in the Control group (CMT) as higher mean Retention scores are seen to associate with the Experimental group.

4.2.3.2.b. Main and Interaction Effects of Instructional Learning Strategies and Classroom Environment on Retention in Malayalam Language (Objectivewise and Total score) – Boys

Data and Results of the Two-way ANOVA employed to study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) of standard VII Boys are presented in Table 4.36.

TABLE 4.36

Summary of Two-way ANOVA for Retention (Objectivewise and Total score) by Instructional Learning Strategies by Classroom Environment for Boys

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Main Effect of Instructional Learning Strategies		Main Effect of Classroom Environ-ment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1	Boys	51	Knowledge	SS MS df F	131.051 131.051 1 6.95*	0.028 0.028 1 0.001	1.609 1.609 1 0.085
2		51	Compre-hension	SS MS df F	62.950 62.950 1 4.16*	13.043 13.043 1 0.862	7.519 7.519 1 0.497
3.		51	Application	SS MS df F	132.619 132.619 1 8.19**	17.045 17.045 1 1.052	3.294 3.294 1 0.203
4.		51	Analysis	SS MS df F	1.470 1.470 1 0.104	0.245 0.245 1 0.017	11.552 11.552 1 0.819
5.		51	Synthesis	SS MS df F	6.382 6.382 1 6.07*	4.207 4.207 1 3.999	5.076 5.076 1 4.825*
6.		51	Evaluation	SS MS df F	2.864 2.864 1 2.302	0.036 0.036 1 0.029	3.345 3.345 1 2.689
7.		51	Retention (Total)	SS MS df F	1319.800 1319.800 1 4.82*	105.330 105.330 1 0.385	177.057 177.057 1 0.647

* Significant at 0.05 level

** Significant at 0.01 level

Main Effect of Instructional Learning Strategies

The F-values for the main effect of Instructional Learning Strategies on Retention are found significant for the Objectives Application ($P < 0.01$, tabled value = 7.19, df: 1, 47), Knowledge, Comprehension, and Synthesis and for the Total score ($P < 0.05$, tabled value = 4.04, df: 1, 47). Hence it can be inferred that in the case of the Total score and Objectives mentioned earlier, ***change in the Instructional Learning Strategies influences the Retention*** of the standard VII Boys. F-values for the Objectives Analysis and Evaluation are not found significant even at 0.05 level (tabled value = 4.04, df: 1, 47). It suggests that in the case of these two Objectives Instructional Learning Strategies have ***no influence*** upon Retention of standard VII Boys.

Main Effect of Classroom Environment

As Table 4.36 shows, none of the F-values for the main effect of Classroom Environment on Retention (Objectivewise and Total score) of standard VII Boys are significant even at 0.05 level (tabled value = 4.04, df: 1, 47). It reveals that change in the levels of Classroom Environment ***does not create any change*** in Retention (Objectivewise and Total score).

Interaction Effect of Instructional Learning Strategies and Classroom Environment

The interaction effect of Instructional Learning Strategies and Classroom Environment on Retention is found significant only in one Objective Synthesis ($P < 0.05$, tabled value = 4.04, df: 1, 47). Hence it can be inferred that for the Objective Synthesis, ***the combined effect*** of the

Instructional Learning Strategies and Classroom Environment ***creates variation*** in Retention of Boys. In the case of the Total score and the Objectives Knowledge, Comprehension, Application, Analysis and Evaluation, the combined effect of the Instructional Learning Strategies x Classroom Environment ***does not affect*** the Retention as the F-values are not found significant even at 0.05 level (tabled value = 4.04, df: 1, 47).

Graphical Representation of the Interaction Effect

The interaction pattern of the Independent Variables was studied graphically by plotting the Dependent Variable, mean scores of Retention (Objectivewise and Total score) in the ***ordinate*** of the graph and the two levels of Classroom Environment, AACE and BACE as the ***abscissa***. Instructional Learning Strategies (CLS and CMT) are represented by ***lines*** on the graph. The pattern of interaction for Boys is shown in Figure 4-15.

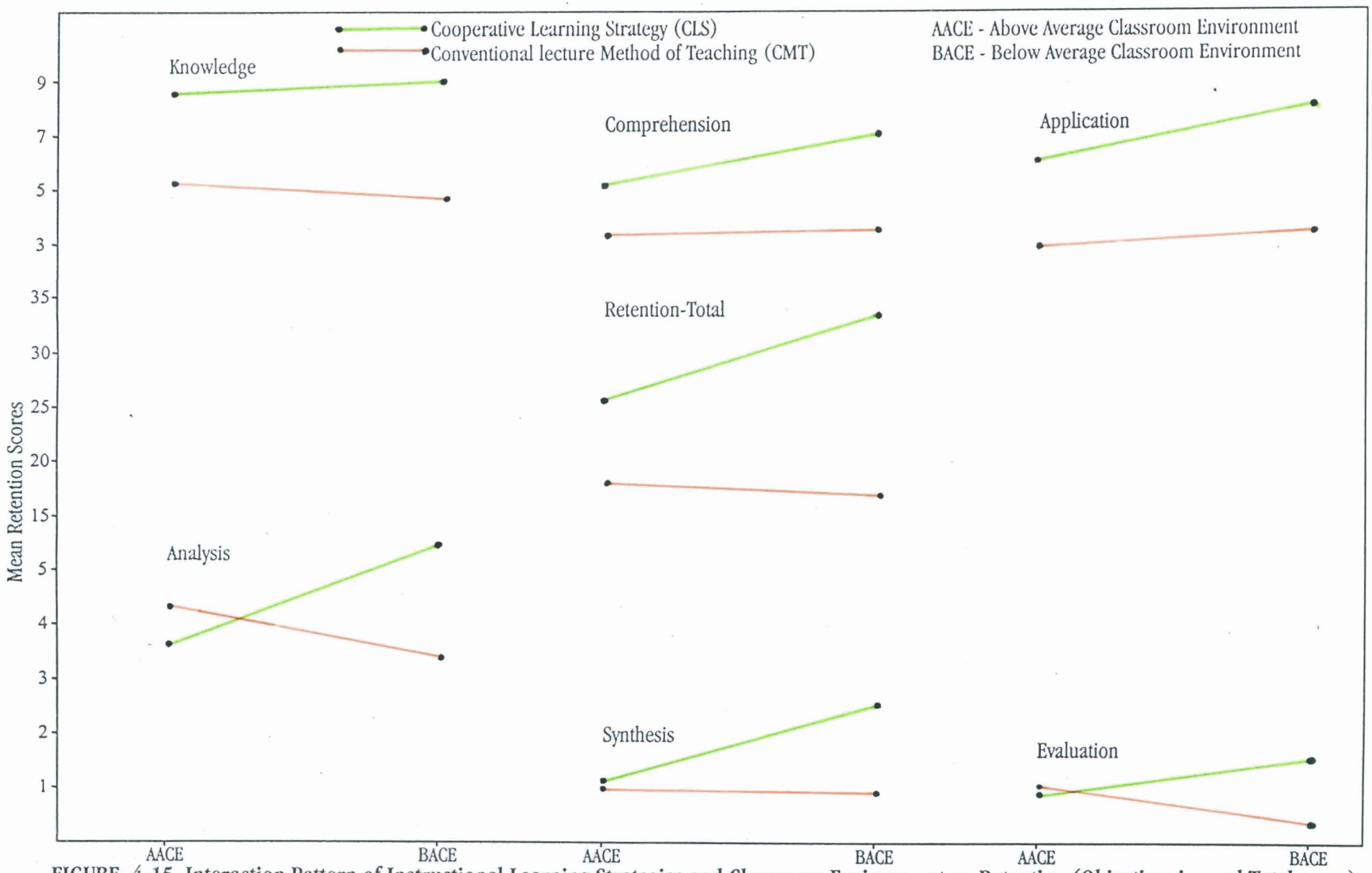


FIGURE 4-15 Interaction Pattern of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) - Boys.

As shown in Figure 4-15, for Total and the Objectivewise Retention in Knowledge, Comprehension, Application and Synthesis, the BACE shows ***higher mean scores with CLS*** than the AACE. Moreover, for Total score, and for the Objectives Knowledge and Synthesis, the AACE shows higher mean Retention scores with Conventional lecture Method of Teaching (CMT) than the BACE. In the Objective Synthesis, the AACE group shows almost equal performance with CLS and CMT. In the case of the two Objectives, Analysis and Evaluation, a considerable tendency of interaction of the Independent Variables can be observed. But statistically these interactions are not significant.

Scheffe' Test of Post-hoc Comparison

Significant F-values were obtained in the study of the main effect of Instructional Learning Strategies on Retention of Boys. Hence the mean Retention (Total and Objectivewise scores in Knowledge, Comprehension, Application and Synthesis) of the two groups based on Instructional Learning Strategies (CLS and CMT) were compared using Scheffe' Test of Post-hoc Comparison.

Data and Results of the Scheffe' Test for Boys are presented in Table 4.37.

TABLE 4.37

Results of the Scheffe' Test of Post-hoc Comparison Between the Means of Retention (Objectivewise and Total score) for Boys Based on Two Groups of Instructional Learning Strategies

Sample	Dependent Variable	Groups Compared	Means		Number of Students		F-value	Values of F'		Level of Significance
			M_1	M_2	N_1	N_2		0.05	0.01	
Boys	Knowledge	CLS - CMT	8.65	4.97	20	31	8.75	4.03	7.17	0.01
	Comprehension	CLS - CMT	5.65	3.65	20	31	3.23	2.81 (0.10)	7.17	0.10
	Application	CLS - CMT	6.75	3.65	20	31	7.24	4.03	7.17	0.01
	Synthesis	CLS - CMT	1.55	1.06	20	31	2.73	1.35 (0.25)	7.17	0.25
	Retention (Total)	CLS - CMT	27.85	17.74	20	31	4.54	4.03	7.17	0.05

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As per Table 4.37, significant F-values are obtained for Retention (Total score P<0.05, Knowledge P < 0.01, Comprehension P < 0.10, Application P < 0.01 and Synthesis P < 0.25) in Boys. All these F-ratios are significant as they exceed the corresponding values of F'. It suggests that, for Boys, ***significant difference*** exists between the two groups (Cooperative Learning Strategy and Conventional lecture Method) with regard to the mean Retention scores (Total and Objectivewise mentioned earlier). The CLS group is found accountable for this significant difference as it has higher mean Retention scores as revealed from the Scheffe' Test. The CLS group to which Cooperative Learning was applied is found advantageous than the CMT group.

4.2.3.2.c. Main and Interaction Effects of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) - Girls

Summary of the Two-way ANOVA employed to study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) of Girls is presented in Table 4.38.

TABLE 4.38

Summary of Two-way ANOVA for Retention (Objectivewise and Total score) by Instructional Learning Strategies by Classroom Environment for Girls

Sl. No.	Sample	Number of Students (N)	Dependent Variable	Main Effect of Instructional Learning Strategies		Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1	Girls	49	Knowledge	SS MS df F	122.745 122.745 1 14.44**	1.607 1.607 1 0.189	4.44 4.44 1 0.522
2		49	Compre-hension	SS MS df F	5.936 5.936 1 0.669	0.278 0.278 1 0.031	25.708 25.708 1 2.896
3.		49	Application	SS MS df F	58.850 58.850 1 5.24*	4.866 4.866 1 0.433	9.886 9.886 1 0.880
4.		49	Analysis	SS MS df F	0.434 0.434 1 0.036	1.734 1.734 1 0.144	18.320 18.320 1 1.516
5.		49	Synthesis	SS MS df F	0.176 0.176 1 0.196	0.103 0.103 1 0.115	3.615 3.615 1 4.019
6.		49	Evaluation	SS MS df F	0.033 0.033 1 0.041	0.033 0.033 1 0.041	1.484 1.484 1 1.844
7.		49	Retention (Total)	SS MS df F	487.703 487.703 1 3.363	33.865 33.865 1 0.234	314.052 314.052 1 2.165

* Significant at 0.05 level

** Significant at 0.01 level

Main Effect of Instructional Learning Strategies

From Table 4.38 it can be seen that, among the seven F-values obtained for the main effect of Instructional Learning Strategies on Retention in Girls, only one (Knowledge) is significant at 0.01 level (tabled value = 7.23, df: 1, 45) and another one (Application) is found significant at 0.05 level (tabled value = 4.06, df: 1, 45). These results suggest that in the case of Knowledge and Application, ***Retention has been influenced by the change in the Instructional Learning Strategies***.

In the case of the Total score and in the Objectives Comprehension, Analysis, Synthesis and Evaluation, Retention ***has not been influenced*** by the change in the Instructional Learning Strategies as their F-values are statistically not significant.

Main Effect of Classroom Environment

None of the seven F-values for the main effect of Classroom Environment on Retention are found significant as shown in Table 4.38. It indicates that Retention (Objectivewise and Total score) of standard VII Girls is *independent* of the change in the levels of Classroom Environment.

Interaction Effect of Instructional Learning Strategies and Classroom Environment

All of the seven F-values for the interaction effect of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) are found below the tabled value (4.06) for 1,45 df, at 0.05 level of significance. It shows that the combined effect of

Instructional Learning Strategies and Classroom Environment ***does not cause*** a change in the level of Retention (Objectivewise and Total score).

Graphical Representation of the Interaction Effect

Graphical pattern of the interaction effect of the Independent Variables was constructed by plotting the mean scores of Retention (Objectivewise and Total score) in the ***ordinate*** of the graph and the two levels of Classroom Environment (AACE and BACE) as the ***abscissa.*** Instructional Learning Strategies (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching CMT) are represented by ***lines*** on the graph. The graphical pattern of interaction (for Girls) is shown in Figure 4-16.

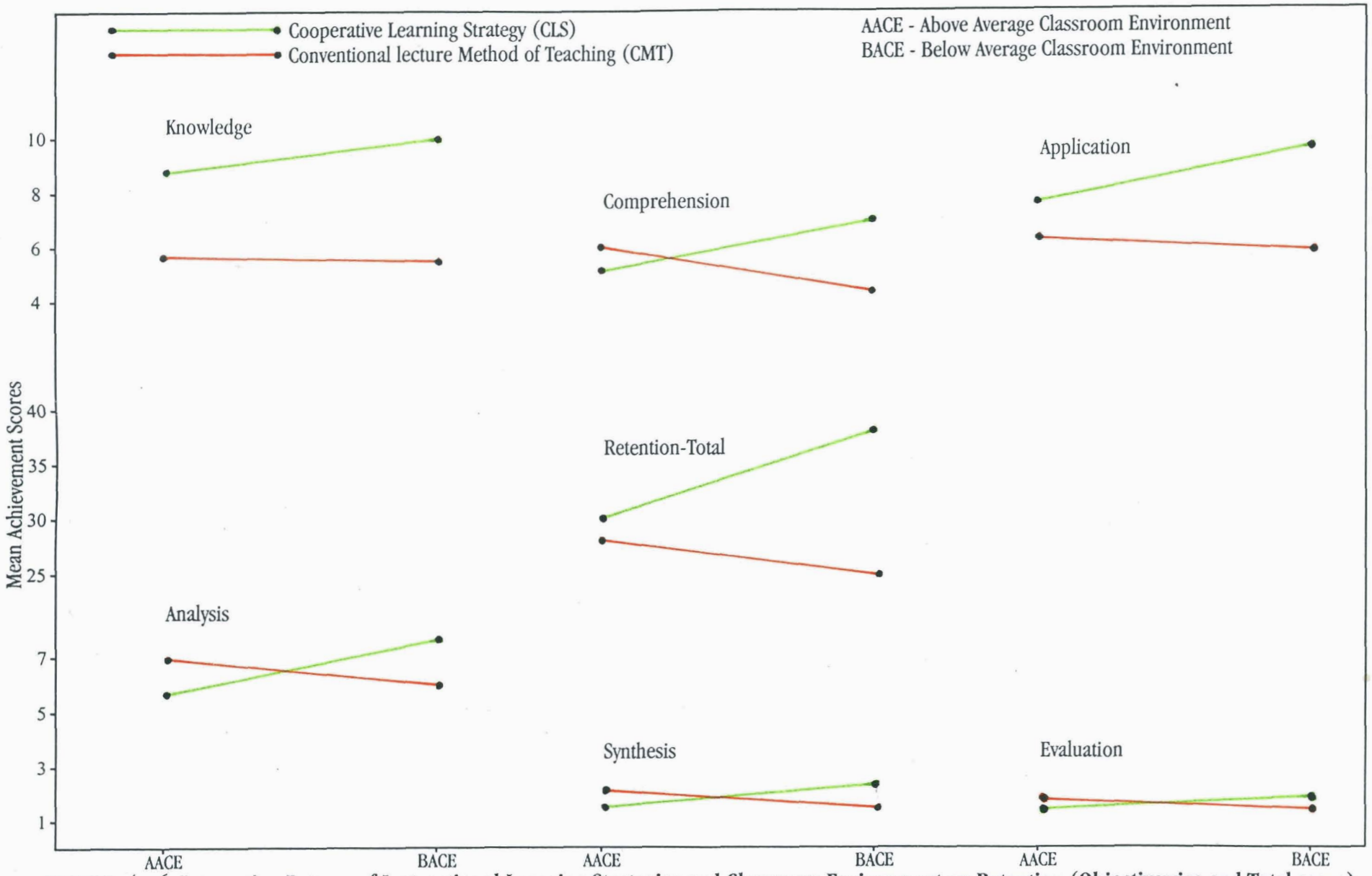


FIGURE 4-16 Interaction Pattern of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) - Girls.

Figure 4-16 shows that, in Girls, the BACE group benefited more with CLS than the AACE with CLS. But, AACE group has higher mean Retention scores with Conventional lecture Method of Teaching (CMT) than BACE with CMT. In the case of the Objectives Comprehension, Analysis, Synthesis and Evaluation, when the AACE group favours Conventional lecture Method of Teaching (CMT), the BACE favours Cooperative Learning Strategy (CLS). Figure 4-16 also shows a notable tendency of interaction of the Independent Variables in the case of the Objectives Comprehension, Analysis, Synthesis and Evaluation. But statistically, these interactions are not significant.

Scheffe' Test of Post-hoc Comparison

To compare the mean Retention scores of Girls of the two groups based on Instructional Learning Strategies (CLS and CMT), Scheffe' Test of Post-hoc Comparison was used. The comparison was done only for the Dependent Variables (Knowledge and Application) which show significant F-values for the main effect of Instructional Learning Strategies.

Data and Results of the Scheffe' Test for Girls are presented in Table 4.39.

TABLE 4.39

Results of the Scheffe' Test of Post-hoc Comparison Between the Means of Retention (Knowledge and Application) for Girls Based on Two Groups of Instructional Learning Strategies

Sample	Dependent Variable	Groups Compared	Means		Number of Students		F-value	Values of F'		Level of Significance
			M_1	M_2	N_1	N_2		0.05	0.01	
Girls	Knowledge	CLS - CMT	9.23	5.53	30	19	18.81	4.04	7.19	0.01
	Application	CLS - CMT	8.50	6.00	30	19	6.47	4.04	7.19	0.05

CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As Table 4.39 shows, the obtained F-values for the pairs (CLS - CMT) are 18.81 (Knowledge) and 6.47 (Application), which are significant at 0.01 level and 0.05 level respectively. These significant differences are noticed for the two groups (CLS and CMT) as the F-values are greater than the corresponding values of F' (7.19 and 4.04, df: 1, 47) at 0.01 and 0.05 levels respectively. These results suggest that, for Girls, the two groups based on Instructional Learning Strategies (CLS and CMT) differ significantly in their mean Retention scores (for the Objectives Knowledge and Application). Cooperative Learning Strategy (CLS) is found ***more effective*** than the Conventional lecture Method of Teaching (CMT) as it advantageous with higher mean Retention scores as shown in Table 4.39.

4.2.3.2.d. Summary and Discussion of Analysis of Variance for Retention

In this section the results of the 21 ANOVA (seven ANOVA each for Total sample Boys and Girls) employed to study the main and interaction effect of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) are summarised and discussed.

The F-values obtained for the 21 ANOVA for Retention are consolidated and presented in Table 4.40.

TABLE 4.40

Summary of ANOVA for Retention (Objectivewise and Total score) for Total sample, Boys and Girls

Sl. No.	Sample	Dependent Variable	F-values		
			Main Effect of Instructional Learning Strategies	Main Effect of Classroom Environment	Interaction Effect of Instructional Learning Strategies and Classroom Environment
1.	Total	Knowledge	19.22**	0.127	0.607
2.		Comprehension	4.19*	0.060	3.116
3.		Application	15.85**	0.566	1.067
4.		Analysis	0.40	0.035	4.312*
5.		Synthesis	4.57*	1.960	9.259**
6.		Evaluation	1.10	0.589	5.997*
7.		Retention (Total)	8.95**	0.025	3.194
8.	Boys	Knowledge	6.95*	0.001	0.085
9		Comprehension	4.16*	0.862	0.497
10.		Application	8.19**	1.052	0.203
11.		Analysis	0.104	0.017	0.819
12.		Synthesis	6.07*	3.999	4.825*
13.		Evaluation	2.302	0.029	2.689
14.		Retention (Total)	4.82*	0.385	0.647
15.	Girls	Knowledge	14.44**	0.189	0.522
16.		Comprehension	0.669	0.031	2.896
17.		Application	5.24*	0.433	0.880
18.		Analysis	0.036	0.144	1.516
19.		Synthesis	0.196	0.115	4.019
20.		Evaluation	0.041	0.041	1.844
21.		Retention (Total)	3.363	0.234	2.165

* Significant at 0.05 level

** Significant at 0.01 level

As Table 4.40 shows, out of 21 ANOVA employed to study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score), ***ten*** ANOVA showed significant main effect of Instructional Learning Strategies on Retention (Total and Objectivewise namely Knowledge, Comprehension, Application and Synthesis) for the Total sample and Boys (five each for each sample). Another ***two*** ANOVA yielded significant main effect of Instructional Learning Strategies on Retention in the Objectives Knowledge and Application for Girls. Totally in ***12*** ANOVA, significant main effect of Instructional Learning Strategies on Retention was found. It can be inferred from these results that ***variation in the levels of Instructional Learning Strategies (CLS or CMT) caused variation in the ability to retain the material taught*** (Retention - Total and Objectivewise mentioned earlier) for the Total sample, Boys and Girls.

None of the ANOVA showed significant main effect of Classroom Environment on Retention (Objectivewise and Total score) for the Total sample, Boys and Girls. It indicates that ***Retention*** (Objectivewise and Total score) for Total sample, Boys and Girls, ***did not change with regard to the change in the levels of Classroom Environment.***

In ***three*** ANOVA significant interaction effect was noted for Instructional Learning Strategies and Classroom Environment on Retention in the Objectives Analysis, Synthesis and Evaluation for the Total sample. For Boys too, one ANOVA showed this interaction effect (for the Objective Synthesis). Totally, ***four*** significant interaction effect have been observed. Hence it can be inferred that the ***combined effect of Instructional Learning***

Strategies and Classroom Environment caused variation in Retention (for the Objectives mentioned earlier) for the Total sample and Boys. ***None*** out of seven ANOVA conducted for Girls, showed significant interaction effect. It indicated that for Girls, Retention (Objectivewise and Total score) was ***independent of the combined effect of Instructional Learning Strategies and Classroom Environment.***

The Interaction effect of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) has been studied graphically. The general trend in all graphical patterns was that, the ***BACE group was more benefited in Retention with Cooperative Learning Strategy*** than the AACE group. In all cases (Retention - Objectivewise and Total score for Total sample, Boys and Girls), the ***BACE group yielded higher Achievement with Cooperative Learning Strategy (CLS)***, where as the AACE group was not consistent in higher Achievement with CLS.

Chapter 5

SUMMARY FINDINGS AND SUGGESTIONS

- Study in Retrospect
- Major Findings
- Tenability of Hypotheses
- Educational Implications of the Study
- Suggestions for Further Research

5 SUMMARY FINDINGS AND SUGGESTIONS

This chapter contains an overview of the significant aspects of the *stages of conducting the experiment,* the *major findings,* their *educational implications* and *suggestions for further research.*

5.1. STUDY IN RETROSPECT

The various aspects related to the different stages of the present experiment, such as, the problem, the variables, objectives and hypotheses are given briefly as follows.

5.1.1. RESTATEMENT OF THE PROBLEM

The problem of the present study was stated as INFLUENCE OF INSTRUCTIONAL LEARNING STRATEGIES AND CLASSROOM ENVIRONMENT ON ACHIEVEMENT AND RETENTION IN MALAYALAM LANGUAGE OF STANDARD VII PUPILS.

5.1.2. VARIABLES

The following Independent Variables, Dependent Variables and Control Variables were selected for the present study.

5.1.2.1. Independent Variables

The following were the Independent Variables selected for the study.

5.1.2.1.a. **Instructional Learning Strategies** (Cooperative Learning - Jigsaw II Model and Conventional lecture Method of Teaching) and

5.1.2.1.b. **Classroom Environment**

5.1.2.2. Dependent Variables

Dependent Variables selected for the present study were the following.

5.1.2.2.a. **Achievement in Malayalam Language** (Objectivewise scores in Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation and a Total score).

5.1.2.2.b. **Retention in Malayalam Language** (Objectivewise scores in Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation and a Total score).

5.1.2.3. Control Variables

The following were the Control Variables selected for the present study.

5.1.2.3.a. Pre-experimental Status in terms of Achievement in Malayalam Language (Pretest score)

5.1.2.3.b. Verbal Intelligence

5.1.2.3.c. Non-verbal Intelligence

5.1.3. OBJECTIVES

The Objectives of the present study were the following.

5.1.3.1. To study whether there exists any difference or not in the mean ***Achievement scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

5.1.3.2. To study whether there exists any difference or not in the mean ***Gain scores*** of the Experimental and Control groups for the Total sample, Boys and Girls.

5.1.3.3. To study whether there exists any difference or not in the mean ***Retention scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

5.1.3.4. To study the effectiveness of ***Cooperative Learning Strategy*** over ***Conventional lecture Method of Teaching,*** if any, in terms of Achievement in Malayalam Language of standard VII pupils.

5.1.3.5. To study the effectiveness of ***Cooperative Learning Strategy*** over ***Conventional lecture Method of Teaching,*** if any, in terms of Retention in Malayalam Language of standard VII pupils.

5.1.3.6. To study the main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.3.7. To study the interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***)

on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.3.8. To study the main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objetivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.3.9. To study the interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.4. HYPOTHESES

The following hypotheses were formulated for the present study.

5.1.4.1. There will be no significant difference in the mean ***Achievement scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

5.1.4.2. There will be no significant difference in the mean ***Gain scores*** of the Experimental and Control groups for the Total sample, Boys and Girls.

5.1.4.3. There will be no significant difference in the mean ***Retention scores*** (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls.

5.1.4.4. Pupils taught through ***Cooperative Learning Strategy*** will not differ significantly from pupils taught through ***Conventional***

lecture Method of Teaching in terms of ***Achievement in Malayalam Language*** of standard VII pupils.

5.1.4.5. Pupils taught through ***Cooperative Learning Strategy*** will not differ significantly from pupils taught through ***Conventional lecture Method of Teaching*** in terms of ***Retention in Malayalam Language*** of standard VII pupils.

5.1.4.6. There will be no significant main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.4.7. There will be no significant interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Achievement in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.4.8. There will be no significant main effects of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language*** (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.4.9. There will be no significant interaction effect of the Independent Variables (***Instructional Learning Strategies*** and ***Classroom Environment***) on ***Retention in Malayalam Language***

(Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls.

5.1.5. METHODOLOGY

The methodology adopted for the present study is briefly discussed in this section.

5.1.5.1. Design of the Study

As this is an experiment, true experimental design was adopted for the present study. ***The Pretest-Post test Equivalent Groups Design*** was selected. The Experimental group was taught through ***Cooperative Learning Strategy*** and the Control group was taught through ***Conventional lecture Method of Teaching***. Both of the groups were taught by the investigator.

5.1.5.2. Sample for the Study

Two intact classroom groups of 50 standard VII pupils each (Total 100 pupils) from two schools in Palakkad district were selected as the sample. These two groups were equated with regard to some select variables. One of these groups (50 pupils) was treated as the Experimental group and the other (50 pupils) as the Control group.

5.1.5.3. Selection of Topic for Treatment

The topic for treatment in the present study was selected from the syllabus prescribed for standard VII pupils of Kerala state for the academic year 2000 - 2001. The curriculum, syllabus and text book prescribed were studied carefully before selecting the topic. Besides, the investigator

consulted with experts and teachers concerned. Thus six prose lessons and three poems (total nine lessons), including language exercises (grammar and structure) were selected. The prose lessons were ***Eenathil Thalathil, Kathayum Kaliyum, Irulum Velichavum, Sastrathinte Mantrikacheppu, Kashmir Thazhvarayil*** and ***Vijayathil Pothinja Parajayam.*** The poems selected were ***Pootha Mavineppatti, Maveliyam Varavathunde*** and ***Bodhavati.*** All lessons were examined thoroughly and found amenable to Cooperative Learning (Jigsaw-II Model) and Conventional lecture Method of Teaching.

5.1.5.4. Tools Used for Treatment

The tools used for treatment (Instructional materials) in the present study were the following.

a) ***Lesson Transcripts for Cooperative Learning Strategy - Jigsaw II Model*** (Kumar & Sasidharan, 2001)

Lesson Transcripts for Cooperative Learning Strategy (Jigsaw-II Model) were prepared by the investigator according to the suggestions of Aronson, *et al.* (1978) and Slavin (1980). Twenty seven Lesson Transcripts were prepared for twenty seven periods (each of 90 minutes duration). In each Lesson Transcript there were four consecutive phases.

b) ***Lesson Transcripts for Conventional lecture Method of Teaching*** (Sasidharan, 2001)

The investigator prepared Lesson Transcripts for teaching through the Conventional lecture Method, on the basis of principles of objective based instruction followed in almost all the primary schools in Kerala.

Fiftyfour Lesson Transcripts were prepared for fifty four periods (each of 45 minutes duration) with a view to equalise the treatment duration.

5.1.5.5. Other Tools Used

Other tools used for the present study were the following:

a) ***Classroom Environment Inventory*** (Pillai & Sunitha, 1996)

The Classroom Environment Inventory prepared by Pillai and Sunitha (1996) was used to measure pupils' perceptions of their Classroom Environment. 50 items (all in the form of statements) have been included in the inventory.

b) ***Verbal Group Test of Intelligence*** (Kumar, *et al.*, 1997)

In the present study, the Control Variable, Verbal Intelligence was measured by the ***Verbal Group Test of Intelligence*** developed and standardised by Kumar, *et al.* (1997).

c) ***Standard Progressive Matrices Test*** (Raven, 1958)

The standard form of the Raven's Progressive Matrices Test (Raven, 1958) was used to measure the Control Variable, Non-verbal Intelligence. The test consists of five subtests of twelve items each. It is a popular measure of the 'g' factor of intelligence.

d) ***Achievement Test in Malayalam Language*** (Kumar & Sasidharan, 2001)

In order to determine the effectiveness of Instructional Learning Strategies (Cooperative and Conventional) an Achievement Test in

Malayalam Language was prepared by the investigator on the topics selected for treatment. The present test was based on the ***Taxonomy of Educational Objectives*** suggested by Bloom (1979). This test was used to determine the Achievement as well as Retention in Malaylam Language. It was also used as the Pretest to measure the Control Variable, ***Pre-experimental Status in Achievement***.

e) ***General Data Sheet for Assessing Socio-Economic Status - SES***

To measure the Socio-Economic Status (SES) of the sample of both the Experimental and Control groups, and thus to compare both the groups in terms of SES, a General Data Sheet was used. In the Data Sheet there are nine columns each for father and mother of the student through which information about their education, occupation and income can be collected.

f) ***Classroom Interaction Rating Scale – CIRS*** (Kumar & Sasidharan, 2001)

A Classroom Interaction Rating Scale was prepared to investigate the nature of classroom interaction under the Cooperative situation and the Conventional situation (Lecture Method).

5.1.5.6. Execution of the Experiment

After obtaining the permission from the Heads of the two schools, arrangements were made to collect the data from both the schools and a schedule was prepared accordingly. As a first step of data collection, the same Pretest was given to both the Experimental and Control groups before starting the treatment. This was done to measure the Pre-experimental Status of the subjects in terms of Achievement in Malayalam Language. An Achievement Test in Malayalam Language was used for this purpose.

a. Experimental Treatment

The Experimental group was taught through Cooperative Learning Strategy (Jigsaw-II Model) for 27 periods. Duration of each period was 90 minutes. Thus the total time duration of the Experimental treatment was 40 hours and 30 minutes. A total of nine units (six prose lessons and three poems) were taught to the Experimental group.

b. Control Treatment

Conventional lecture Method of Teaching was used for the Control treatment. Only Conventional teaching aids were used. The topics selected and time duration of treatment were the same as in the Experimental treatment.

c. Data Collection Procedure

As described earlier, the same Pretest was administered in both the groups. The Post test data were collected from both the Experimental and Control groups the next day after the completion of the treatment. The Achievement test that has already been used as the Pretest, was utilized for this purpose. The same Achievement test was again administered in both the groups one month after the completion of the treatment. Thus the data on Retention in Malayalam Language were collected.

During the treatment period Data on other variables such as Classroom Environment, Verbal Intelligence, Non-verbal Intelligence and Socio-Economic Status were collected from both the Experimental and Control groups. Appropriate tools were utilized for this purpose. Data on Classroom Interaction also were collected from both the groups.

d. Scoring and Consolidation of Data

All response sheets were scored according to the respective test manuals, scoring keys and valuepoints. Completed (in all respects) response sheets only were taken into consideration. After scoring the response sheets, the scores were tabulated separately for the Experimental and Control groups.

5.1.5.7. Statistical Techniques

The analysis of the data was done using the following statistical techniques.

a) Mean Difference Analysis

Test of Significance of Difference between Means was used to compare the relevant variables between the Experimental and Control groups. This statistical technique was mainly employed to study whether the Experimental and Control groups differ in Achievement, Gain and Retention scores without controlling the effects of the Covariates. Mean Difference Analysis was also employed to equate the Experimental and Control groups with regard to the Pre-experimental Status (Pretest score), Verbal and Non-verbal Intelligence and Socio-Economic Status of the pupils. To compare the nature of interaction in the Cooperative and Conventional classrooms, this technique was resorted.

b) Analysis of Covariance (ANCOVA)

Two-Factor ANCOVA employing three Covariates (separately and in combination) was used to compare the effectiveness of Instructional

Learning Strategies (Cooperative Learning Strategy and Conventional lecture Method of Teaching) on Achievement and Retention in Malayalam Language (Objectivewise and Total score), after controlling the Covariates (singly and jointly).

c) Two-way Analysis of Variance (ANOVA) with 2 x 2 Factorial Design

To study the main and interaction effects of the Independent Variables on the Dependent Variables, Two-way ANOVA with 2x2 Factorial design was used. In the 2x2 Factorial design, two levels of Instructional Learning Strategies (Cooperative Learning - Jigsaw II Model and Conventional lecture Method) and two levels of Classroom Environment (Above Average Classroom Environment - AACE and Below Average Classroom Environment - BACE) were utilised.

d) Scheffe' Test of Post-hoc Comparison

Scheffe' Test of Post-hoc Comparison was used after ANCOVA and ANOVA to compare the criterion means of the Experimental and Control groups to study the group difference.

5.2. MAJOR FINDINGS

The major findings of the present study are presented briefly as follows.

5.2.1. RESULTS OF THE INVESTIGATION OF CLASSROOM INTERACTION

For comparing the classroom interaction under Cooperative classroom set up and Conventional classroom set up, the Mean Difference

Analysis and Percentage of scores were used. The t-values obtained for the comparison for each category of classroom interaction are given in the descending order as follows.

Category of Interaction	**t-value**
Inter-group Interaction	11.56**
Student-teacher Interaction	9.91**
Intra-group Interaction	4.13**

** $P < 0.01$.

Significant difference in the nature of classroom interaction between the Cooperative and Conventional set up was noticed. In all of these comparisons, higher mean scores were seen to attach with the Cooperative classroom group. Thus it was evident that, classroom interaction was higher in the Cooperative classroom group than the Conventional classroom group. Percentage of scores of each category, obtained for the two groups also revealed this fact. This finding is in agreement with the earlier reports of Angry (1990), Felder (1995) and Xin (1996).

5.2.2. RESULTS OF THE MEAN DIFFERENCE ANALYSIS

Mean Difference Analysis was done as an initial step to study whether there exists or not any difference between the Experimental and Control groups (Total sample, Boys and Girls) with regard to ***Achievement, Gain*** and ***Retention scores*** in Malayalam Language without controlling the select variables. Results of the Mean Difference Analysis are presented in the following sub-sections.

5.2.2.1. Difference in Achievement (Objectivewise and Total score) Between the Experimental and Control Groups

There was ***significant difference*** in the comparison of the mean Achievement; Total and Objectivewise scores in Knowledge, Comprehension, Application, Synthesis and Evaluation for the Total sample. For Boys, in Achievement - Total and in the Objectives Knowledge and Application, significant difference was noted. In Achievement - Total and in the Objectives Knowledge, Comprehension, Application and Synthesis, significant difference was found for Girls. The significant t-values obtained for the Total sample, Boys and Girls are arranged in the decreasing order of magnitude.

Sample	Dependent Variable	t-value
Total sample	Knowledge	5.46**
	Application	4.07**
	Achievement (Total score)	3.67**
	Synthesis	3.15**
	Evaluation	2.32*
	Comprehension	2.19*
Boys	Knowledge	2.98**
	Application	2.44*
	Achievement (Total score)	2.02*
Girls	Knowledge	4.20**
	Achievement (Total score)	2.70**
	Application	2.64**
	Comprehension	2.14*
	Synthesis	2.00*

* Significant at 0.05 level
** Significant at 0.01 level

The t-values for Analysis for the Total sample, Comprehension, Analysis, Synthesis and Evaluation for Boys and Analysis and Evaluation for Girls were not found significant even at 0.05 level.

5.2.2.2. Difference in Gain Scores Between the Experimental and Control Groups

Significant difference was found between the Experimental and Control groups in the comparison of the mean Gain scores for the Total

sample, Boys and Girls. The significant t-values obtained are arranged in the decreasing order of magnitude as follows.

Variable	Sample	t-value
Gain scores	Total sample	4.35**
	Girls	3.21**
	Boys	2.45*

* Significant at 0.05 level
** Significant at 0.01 level

5.2.2.3. Difference in Retention (Objectivewise and Total score) Between the Experimental and Control Groups

Significant difference was noticed in the comparison of the mean Retention scores; Total and Objectivewise namely Knowledge, Comprehension, Application and Synthesis for the Total sample. In Retention - Total and in the Objectives Knowledge and Application for Boys and Girls, significant difference was found between the Experimental and Control groups. The significant t-values obtained are arranged in the decreasing order of magnitude and presented.

Sample	Dependent Variable	t-value
Total sample	Knowledge	5.27**
	Application	4.30**
	Retention (Total)	3.56**
	Comprehension	2.45*
	Synthesis	2.11*
Boys	Knowledge	2.77**
	Application	2.63**
	Retention (Total)	2.00*
Girls	Knowledge	4.36**
	Application	2.69**
	Retention (Total)	2.18*

* Significant at 0.05 level
** Significant at 0.01 level

The t-values obtained for the Objectives Analysis and Evaluation for the Total sample, and Comprehension, Analysis, Synthesis and Evaluation for Boys and Girls were not found significant.

5.2.2.4. Conclusion of the Results of Mean Difference Analysis

Test of Significance of Difference between Means of Large and Small Independent Samples was employed to study whether the Experimental and Control groups differ or not in terms of Achievement (Objectivewise and Total score), Gain score and Retention (Objectivewise and Total score), before controlling the Covariates. The t-test was done separately for the Total sample, Boys and Girls.

Seven comparisons each for the Total sample, Boys and Girls were employed to study the difference between the Experimental and Control groups with regard to Achievement (Objectivewise and Total score). In which, six in the Total sample, three in Boys and five in Girls yielded significant t-values. Thus, for Achievement, out of 21 t-tests employed 14 yielded significant difference. It indicates that the Experimental and Control groups (Total sample, Boys and Girls) have significant difference in terms of Achievement (relevant Objectives and Total score) before controlling the Covariates.

All of the three comparisons employed (one each for Total sample Boys and Girls) to study the difference in the mean Gain scores of the Experimental and Control groups, yielded significant t-values. It suggests that there exists significant difference between the Experimental and Control groups (Total sample, Boys and Girls) with regard to the Gain score.

To study the difference in Retention (Objectivewise and Total score) between the Experimental and Control groups before controlling the Covariates, seven comparisons each for the Total sample, Boys and Girls were employed. In which, five in Total sample, three each in Boys and Girls showed significant t-values. Thus, 11 t-tests, out of 21 employed yielded significant t-values for Retention of the Total sample, Boys and Girls. These results revealed the significant difference between the Experimental and Control groups (Total sample, Boys and Girls) in terms of Retention (relevant Objectives and Total score) before controlling the Covariates.

5.2.3. RESULTS OF THE COVARIANCE ANALYSIS FOR ACHIEVEMENT

This part of the Analysis of Covariance was used to know whether the Experimental and the Control groups differ significantly or not, in terms of Achievement (Objectivewise and Total score) in Malayalam Language when selected variables are controlled. Scheffe' Test of Post-hoc Comparison was employed after ANCOVA which showed significant F-values in the comparison. By Scheffe' Test the investigator could identify the group (whether Experimental or Control group) which caused the difference in Achievement. The results of the Covariance Analysis for Achievement are briefly presented in the following sub-sections.

5.2.3.1. Effectiveness of Instructional Learning Strategies on Achievement - Pre-experimental Status (Pretest Score) Controlled Singly

Results of the ANCOVA with Pre-experimental Status as Covariate revealed that the F-values for Instructional Learning Strategies on Achievement - Total and on the Objectives Knowledge, Application and Synthesis were significant. The significant F-values are presented in the decreasing order of magnitude as follows.

Dependent Variable	F-value
Knowledge	28.44**
Application	16.20**
Achievement (Total)	10.26**
Synthesis	5.57*

* Significant at 0.05 level

** Significant at 0.01 level

The F-values for the Objectives Comprehension, Analysis and Evaluation were not found significant.

The relevant adjusted criterion means of the Dependent Variables those have significant F-ratios were compared using Scheffe' Test of Post-hoc Comparison. Significant F-values were found in all of these comparisons. It indicates that the Experimental and Control groups differ in terms of these Dependent Variables. F-values obtained in the Scheffe' Test are arranged in the decreasing order of magnitude and presented as follows.

Groups Compared	**Dependent Variable**	**F-value**
CLS - CMT (Experimental-Control)	Knowledge	36.74**
CLS - CMT (Experimental-Control)	Application	20.92**
CLS - CMT (Experimental-Control)	Achievement (Total)	13.26**
CLS - CMT (Experimental-Control)	Synthesis	7.18**

**P < 0.01
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

In all of these comparisons, high Achievement scores were seen to associate with the Experimental group to which Cooperative Learning Strategy was applied and this highlighted the ***effectiveness of Cooperative Learning Strategy (Jigsaw-II Model)*** over the Conventional lecture Method of Teaching.

5.2.3.2. Effectiveness of Instructional Learning Strategies on Achievement - Verbal Intelligence Controlled Singly

When Verbal Intelligence of the subjects was controlled statistically, the ANCOVA yielded significant F-values for Instructional Learning Strategies on Achievement - Total score and on the Objectives, Knowledge, Application and Synthesis. The F-values obtained in the ANCOVA are presented in the descending order as follows.

Dependent Variable	F-value
Knowledge	33.63**
Application	20.91**
Achievement (Total)	14.43**
Synthesis	8.14**

**P < 0.01

The F-values for the Objectives Comprehension, Analysis and Evaluation were not found significant.

Scheffe' Test done after ANCOVA to compare the Experimental and Control groups with regard to these Dependent Variables showed significant F-values. All of these comparisons indicated difference between the Experimental and Control groups. Those F-values are presented in the descending order.

Groups Compared	Dependent Variable	F-value
CLS - CMT (Experimental-Control)	Knowledge	42.87**
CLS - CMT (Experimental-Control)	Application	26.64**
CLS - CMT (Experimental-Control)	Achievement (Total)	18.39**
CLS - CMT (Experimental-Control)	Synthesis	10.40**

**P < 0.01
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

In all of these comparisons, the Experimental group showed higher Achievement scores. It proved the ***superiority of the Cooperative Learning Strategy*** over the Conventional lecture Method of Teaching.

5.2.3.3. Effectiveness of Instructional Learning Strategies on Achievement - Non-verbal Intelligence Controlled Singly

Significant F-values were found for Instructional Learning Strategies on Achievement, when Non-verbal Intelligence of the subjects was controlled singly. In the ANCOVA, significant F-values were obtained for Achievement - Total score, and for the Objectives Knowledge, Application, Synthesis and Evaluation. Those significant F-values are arranged in the decreasing order of magnitude and presented as follows.

Dependent Variable	F-value
Knowledge	30.83**
Application	19.02**
Achievement (Total)	13.98**
Synthesis	8.52**
Evaluation	4.03*

* Significant at 0.05 level
** Significant at 0.01 level

For the Objectives Comprehension and Analysis, no significant F-values were found.

When group difference was studied using Scheffe' Test of Post-hoc Comparison between the adjusted criterion means which showed significant F-values in the ANCOVA, ***significant difference*** in the adjusted criterion means of the Experimental and Control groups was obtained. F-values obtained in the Scheffe' Test are arranged in the decreasing order of magnitude and presented in the break up.

Groups Compared	Dependent Variable	F-value
CLS - CMT (Experimental-Control)	Knowledge	39.26**
CLS - CMT (Experimental-Control)	Application	24.21**
CLS - CMT (Experimental-Control)	Achievement (Total)	17.80**
CLS - CMT (Experimental-Control)	Synthesis	10.85**
CLS - CMT (Experimental-Control)	Evaluation	5.14*

* Significant at 0.05 level
** Significant at 0.01 level
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Cooperative Learning Strategy applied to the Experimental group was seen superior to the Conventional lecture Method of Teaching applied to the Control group, because it created higher mean Achievement scores as revealed from the Scheffe' Test.

5.2.3.4. Effectiveness of Instructional Learning Strategies on Achievement - Pre-experimental Status (Pretest Score), Verbal Intelligence and Non-verbal Intelligence Controlled in Combination

When the three Covariates, Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence were controlled jointly in the ANCOVA, Instructional Learning Strategies showed significant F-values on Achievement-Total score and on the Objectives Knowledge,

Application and Synthesis. These F-values are arranged in the descending order and presented as follows.

Dependent Variable	F-value
Knowledge	34.64**
Application	19.84**
Achievement (Total)	13.84**
Synthesis	6.67*

* Significant at 0.05 level
** Significant at 0.01 level

No significant F-values were found for the Objectives Comprehension, Analysis and Evaluation.

Scheffe' Test of Post-hoc Comparison done after ANCOVA, yielded significant difference for all the comparisons between the relevant adjusted means of the Experimental and Control groups. Significant F-values obtained in the Scheffe' Test are arranged in the decreasing order of magnitude and presented in the break up.

Groups Compared	Dependent Variable	F-value
CLS - CMT (Experimental-Control)	Knowledge	45.06**
CLS - CMT (Experimental-Control)	Application	25.76**
CLS - CMT (Experimental-Control)	Achievement (Total)	17.99**
CLS - CMT (Experimental-Control)	Synthesis	8.64**

**P < 0.01
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

In all of these comparisons, the Experimental group to which Cooperative Learning Strategy was used showed higher Achievement than the Control group to which the Conventional lecture Method was used. It indicated the effectiveness of Cooperative Learning Strategy (Jigsaw-II Model) over the Conventional lecture Method.

5.2.4. RESULTS OF THE COVARIANCE ANALYSIS FOR RETENTION

In this section, results of the Covariance Analysis which employed to study the difference between the Experimental and Control groups in terms of Retention in Malayalam Language (Objectivewise and Total score) after controlling the effects of the Covariates (singly and in combination) are presented briefly.

Results of the Scheffe' Test of Post-hoc Comparison done with ANCOVA are also presented herewith. Scheffe' Test helped the investigator to study the group difference (Experimental or Control) with regard to the power of Retention (Objectivewise and Total score).

5.2.4.1. Effectiveness of Instructional Learning Strategies on Retention - Pre-experimental Status (Pretest Score) Controlled Singly

When the effect of the Pre-experimental Status (Pretest score) of the subjects was controlled singly, the results of the ANCOVA revealed significant F-values for Instructional Learning Strategies on Retention - Total score and on the Objectives, Knowledge and Application. These significant F-values are presented in the decreasing order of magnitude as follows.

Dependent Variable	F-value
Knowledge	26.44**
Application	19.39**
Retention (Total)	9.69**

**P < 0.01

There were no significant F-values obtained for Instructional Learning Strategies on Retention in the Objectives Comprehension, Analysis, Synthesis and Evaluation.

The relevant adjusted means were further compared between the Experimental and Control groups in the Scheffe' Test of Post-hoc Comparison. In all of these comparisons, significant F-values were obtained. It indicated that the Experimental and Control groups differed significantly in the adjusted criterion means. These F-values are presented in the descending order as follows.

Groups Compared	Dependent Variable	F-value
CLS - CMT (Experimental-Control)	Knowledge	34.18**
CLS - CMT (Experimental-Control)	Application	25.08**
CLS - CMT (Experimental-Control)	Retention (Total)	12.53**

**P < 0.01
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Higher mean Retention scores of the ***Experimental group*** which was taught through the Cooperative Learning Strategy proved its ***superiority*** in

the power of Retention over the Control group which was taught through the Conventional lecture Method of Teaching.

5.2.4.2. Effectiveness of Instructional Learning Strategies on Retention - Verbal Intelligence Controlled Singly

When Verbal Intelligence of the sample was controlled, results of the ANCOVA showed significant F-values for Instructional Learning Strategies on Retention - Total score and on the Objectives Knowledge, Comprehension, Application and Synthesis. The significant F-values obtained are presented in the decreasing order of magnitude.

Dependent Variable	F-value
Knowledge	34.35**
Application	24.86**
Retention (Total)	14.76**
Comprehension	4.82*
Synthesis	4.77*

* Significant at 0.05 level
** Significant at 0.01 level

The F-values obtained for the Objectives Analysis and Evaluation were not found significant.

In all of the Post-hoc Comparisons between the adjusted criterion means of the Experimental and Control groups, significant difference was found. The F-values obtained in the Scheffe' Test are arranged in the decreasing order of magnitude and presented in the break up.

Groups Compared	Dependent Variable	F-value
CLS - CMT (Experimental-Control)	Knowledge	43.78**
CLS - CMT (Experimental-Control)	Application	31.69**
CLS - CMT (Experimental-Control)	Retention (Total)	18.81**
CLS - CMT (Experimental-Control)	Comprehension	6.15*
CLS - CMT (Experimental-Control)	Synthesis	6.09*

* Significant at 0.05 level
** Significant at 0.01 level
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Evidence for the ***advantage of the Experimental group*** which was taught through ***Cooperative Learning Strategy (Jigsaw-II)*** over the Control group (taught through Conventional lecture Method of Teaching) in terms of the Retention power, was obtained from the Scheffe' Test, as it showed higher mean Retention scores attached with the ***Experimental group***.

5.2.4.3. Effectiveness of Instructional Learning Strategies on Retention - Non-verbal Intelligence Controlled Singly

In the Covariance Analysis with the single effect of the Non-verbal Intelligence controlled, significant F-values were obtained for Instructional Learning Strategies on Retention - Total score and on the Objectives, Knowledge, Comprehension, Application and Synthesis. The significant F-

values obtained are arranged in the decreasing order of magnitude as follows.

Dependent Variable	**F-value**
Knowledge	27.96**
Application	23.78**
Retention (Total)	13.21**
Comprehension	5.01*
Synthesis	4.92*

* Significant at 0.05 level
** Significant at 0.01 level

There were no significant F-values obtained for the Objectives Analysis and Evaluation.

Results of the Scheffe' Test of Post-hoc Comparison revealed ***statistically significant difference*** between the relevant adjusted criterion means of the Experimental and Control groups in terms of the Retention scores. The F-values are arranged in the descending order and presented.

Groups Compared	Dependent Variable	F-value
CLS - CMT (Experimental-Control)	Knowledge	35.59**
CLS - CMT (Experimental-Control)	Application	30.25**
CLS - CMT (Experimental-Control)	Retention (Total)	16.81**
CLS - CMT (Experimental-Control)	Comprehension	6.38*
CLS - CMT (Experimental-Control)	Synthesis	6.26*

* Significant at 0.05 level
** Significant at 0.01 level
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

In all of these comparisons, ***higher mean Retention scores*** were seen to attach with the ***Experimental group*** to which the Cooperative Learning Strategy was used. This fact proved the ***advantage of the Experimental group*** over the Control group to which the Conventional lecture Method was used, with regard to the power of Retention.

5.2.4.4. Effectiveness of Instructional Learning Strategies on Retention - Pre-experimental Status (Pre test Score), Verbal Intelligence and Non-verbal Intelligence Controlled in Combination.

When the combined effect of the three Covariates, Pre-experimental Status (Pretest score), Verbal Intelligence and Non-verbal Intelligence was controlled, the Covariance Analysis yielded significant F-values for

Instructional Learning Strategies on Retention - Total score and on the Objectives Knowledge and Application. The F-values are arranged in the decreasing order of magnitude and presented as follows.

Dependent Variable	**F-value**
Knowledge	34.45**
Application	25.29**
Retention (Total)	13.89**

**P < 0.01

For the Objectives Comprehension, Analysis, Synthesis and Evaluation, the obtained F-values were not found significant.

When the adjusted criterion means of the Experimental and Control groups were compared (Scheffe' Test of Post-hoc Comparison) after ANCOVA, significant F-values were obtained for all the comparisons in terms of the Retention scores as mentioned earlier. The obtained F-values are arranged in the decreasing order of magnitude and presented in the break up.

Groups Compared	**Dependent Variable**	**F-value**
CLS - CMT (Experimental-Control)	Knowledge	44.78**
CLS - CMT (Experimental-Control)	Application	32.84**
CLS - CMT (Experimental-Control)	Retention (Total)	18.04**

**P<0. 01
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teching

Superiority of the Experimental group (taught through Cooperative Learning Strategy) over the Control group (taught through Conventional lecture Method of Teaching) with regard to the ability to retain the material taught was evidenced by the higher mean Retention scores of the ***Experimental group***.

5.2.5. CONCLUSION OF THE RESULTS OF COVARIANCE ANALYSIS

Two-way Factorial ANCOVA with three Covariates (Pre-experimental Status or Pretest score, Verbal Intelligence and Non-verbal Intelligence - separately and in combination) was employed to study the relative effectiveness of Cooperative Learning Strategy and Conventional lecture Method of Teaching on Achievement and Retention in Malayalam Language (Objectivewise and Total score).

For Achievement, ***17 out of 28 ANCOVA*** showed significant F-values, where as for Retention ***16 out of 28 ANCOVA*** showed significant F-values. These results and the results of the Scheffe' Test thereafter done approved the fact that, even after removing the effects of the Covariates (separately and in combination) from the Dependent Variables (Achievement and Retention), the Experimental and Control groups showed significant difference in the mean Achievement and Retention scores (relevant Objectives and Total score). Cooperative Learning Strategy (Jigsaw-II Model) was found to create this significant difference as it has ***higher Achievement and Retention scores than the Conventional lecture Method of Teaching***. These results of the present study are in agreement with the previous research findings of Brauer, *et al.* (1997), Dougherty (1997), Bindhu

(1999), Lee, *et al.* (1999), Joyce (1999), Janes, *et al.* (2000), Holliday (2001) and Kumar and Bindhu (2002).

5.2.6. RESULTS OF THE ANALYSIS OF VARIANCE FOR ACHIEVEMENT

In the present study Two-Factor ANOVA was employed to examine whether Achievement (Objectivewise and Total score) vary or not due to the change in the levels of the Independent Variables (Instructional Learning Strategies and Classroom Environment). The results of the ANOVA have been interpreted with regard to the main effects and interaction effect of the two Independent Variables.

Wherever the Independent Variables showed significant main effect on Achievement, Scheffe' Test of Post-hoc Comparison was used as follow up analysis. This was done to determine which one of the two levels of the Independent Variables (Cooperative Learning Strategy - Conventional lecture Method of Teaching and Above Average Classroom Environment - Below Average Classroom Environment) caused the change in Achievement. The results of the Analysis of Variance for Achievement of the Total sample, Boys and Girls are presented briefly in the following sub-sections.

5.2.6.1. ANOVA for Achievement by Instructional Learning Strategies by Classroom Environment for Total sample

The results of seven ANOVA employed to study the main and interaction effects of the Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) of the Total sample are described briefly as follows.

Main Effect of Instructional Learning Strategies on Achievement

Significant F-values were obtained for the main effect of Instructional Learning Strategies on Achievement (Total and Objectivewise scores in Knowledge, Application and Synthesis) of the Total sample. These F-values are given in the decreasing order of magnitude as follows.

Dependent Variable	F-value
Knowledge	21.28**
Application	13.89**
Achievement (Total)	9.50**
Synthesis	7.12**

**P < 0.01.

For the Objectives Comprehension, Analysis and Evaluation, the F-values were not found significant.

Main Effect of Classroom Environment on Achievement

No significant F-values were noted for the main effect of Classroom Environment on Achievement (Objectivewise and Total score) of the Total sample.

Interaction Effect of Instructional Learning Strategies and Classroom Environment on Achievement

For the interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score), no significant F-values were found for the Total sample.

Comparison of Achievement Between the Experimental and Control Groups

After ANOVA, Scheffe' Test of Post-hoc Comparison was employed wherever needed, for comparing the mean Achievement scores of the two groups based on Instructional Learning Strategies (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT). In all of these comparisons ***significant difference in the mean Achievement scores*** was noticed for the Total sample. The obtained F-values are arranged in the decreasing order of magnitude as follows:

Dependent Variable	**Groups Compared**	**F-value**
Knowledge	CLS - CMT	29.61**
Application	CLS - CMT	16.86**
Achievement (Total)	CLS - CMT	13.44**
Synthesis	CLS - CMT	9.71**

** $P < 0.01$.
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

As higher mean Achievement scores were seen to attach with the CLS group in all the comparisons, the Experimental group (to which CLS was used) can be considered superior to the Control group (to which CMT was used).

Since no significant F-values were found for the main effect of Classroom Environment on Achievement of the Total sample, comparison of the Achievement based on the two levels of Classroom Environment (AACE and BACE) was not done.

5.2.6.2. ANOVA for Achievement by Instructional Learning Strategies by Classroom Environment for Boys

To study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) of Boys, seven ANOVA were employed. The results of the seven ANOVA are described as follows.

Main Effect of Instructional Learning Strategies on Achievement

For the main effect of Instructional Learning Strategies on Achievement of Boys, significant F-values were obtained for the Total score and Objectivewise Achievement in Knowledge and Application. These F-values are presented in the descending order as follows.

Dependent Variable	F-value
Knowledge	8.47**
Application	6.65*
Achievement (Total)	4.39*

* Significant at 0.05 level.
** Significant at 0.01 level.

The F-values for the Objectives Comprehension, Analysis, Synthesis and Evaluation were not found significant.

Main Effect of Classroom Environment on Achievement

The F-values obtained for the main effect of Classroom Environment on Achievement (Objectivewise and Total score) of Boys were not significant.

Interaction Effect of Instructional Learning Strategies and Classroom Environment on Achievement

For the interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score), no significant F-values were found for Boys.

Comparison of Achievement Between the Experimental and Control Groups

All of the F-values obtained in the Scheffé Test of Post-hoc Comparison, done after ANOVA, were found significant in the case of Boys. Hence significant difference in the mean Achievement scores of Boys in the Experimental and Control groups was revealed. These F-values are arranged in the descending order and presented in the break up.

Dependent Variable	Groups Compared	F-value
Knowledge	CLS - CMT	10.40**
Application	CLS - CMT	6.73**
Achievement (Total)	CLS - CMT	4.58*

* Significant at 0.05 level.
** Significant at 0.01 level.
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

The CLS group has advantage over the CMT group as it created higher mean Achievement scores as revealed from the Scheffé Test.

Comparison of the Achievement based on the two levels of Classroom Environment (AACE and BACE) was not needed, because no

significant F-values were noted for the main effect of Classroom Environment on Achievement of Boys.

5.2.6.3. ANOVA for Achievement by Instructional Learning Strategies by Classroom Environment for Girls

The results of the seven ANOVA employed to study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) of Girls are described in this sub-section.

Main Effect of Instructional Learning Strategies on Achievement

Significant F-values were obtained for the main effect of Instructional Learning Strategies on Achievement (Total and Objectivewise scores in Knowledge, Application and Synthesis) of Girls. These F-values are presented in the descending order as follows.

Dependent Variable	F-value
Knowledge	17.32**
Application	7.05*
Achievement (Total)	6.74*
Synthesis	4.68*

* Significant at 0.05 level.
** Significant at 0.01 level.

For the Objectives Comprehension, Analysis and Evaluation, the F-values were not found significant.

Main Effect of Classroom Environment on Achievement

Significant F-values were not obtained for the main effect of Classroom Environment on Achievement (Objectivewise and Total score) of Girls.

Interaction Effect of Instructional Learning Strategies and Classroom Environment on Achievement

No significant F-values were observed for the interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) of Girls.

Comparison of Achievement Between the Experimental and Control Groups

Scheffé Test of Post-hoc Comparison was employed after ANOVA to compare the mean Achievement scores of the two groups (Cooperative Learning Strategy - CLS and Conventional lecture Method of Teaching - CMT). Significant difference in the mean Achievement scores was observed in all of these comparisons. The obtained F-values are arranged in the descending order and presented.

Dependent Variable	Groups Compared	F-value
Knowledge	CLS - CMT	20.46**
Achievement (Total)	CLS - CMT	7.40**
Application	CLS - CMT	7.05*
Synthesis	CLS - CMT	4.04*

* Significant at 0.05 level.
** Significant at 0.01 level.
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

In all of these comparisons higher mean Achievement scores were obtained with the CLS group. Hence it can be considered superior to the CMT group.

Since no significant F-values were found for the main effect of Classroom Environment on Achievement of Girls, comparison of the Achievement based on the two levels of Classroom Environment (AACE and BACE) was avoided.

5.2.7. RESULTS OF THE ANALYSIS OF VARIANCE FOR RETENTION

Two-Factor ANOVA was further used to study whether variation in Retention (Objectivewise and Total score) was attributable or not to the change in the levels of the Independent Variables (Instructional Learning Strategies and Classroom Environment).

The results of the ANOVA have been interpreted in terms of the main and interaction effects of the two Independent Variables.

Scheffé Test was used as a Post-hoc Comparison, wherever necessary. This was done to determine which one of the two levels of the Independent Variables (Cooperative Learning Strategy - CLS, Conventional lecture Method of Teaching - CMT and Above Average Classroom Environment - AACE, Below Average Classroom Environment - BACE) created variation in Retention. In the following sub-sections, the results of the ANOVA for Retention (Objectivewise and Total score) for the Total sample, Boys and Girls are presented briefly.

5.2.7.1. ANOVA for Retention by Instructional Learning Strategies by Classroom Environment for Total sample

Seven ANOVA were employed to study the main and interaction effects of the Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) of the Total sample. The results of these ANOVA are briefly discussed as follows.

Main Effect of Instructional Learning Strategies on Retention

For the Total sample, significant main effect of Instructional Learning Strategies on Retention - Total and Objectivewise scores in Knowledge, Comprehension, Application and Synthesis were obtained. The significant F-values are presented in the decreasing order of magnitude as follows.

Dependent Variable	F-value
Knowledge	19.22**
Application	15.85**
Retention (Total)	8.95**
Synthesis	4.57*
Comprehension	4.19*

* Significant at 0.05 level
** Significant at 0.01 level

The F-values for the Objectives Analysis and Evaluation were not found significant.

Main Effect of Classroom Environment on Retention

No significant main effect of Classroom Environment on Retention (Objectivewise and Total score) was noted.

Interaction Effect of Instructional Learning Strategies and Classroom Environment on Retention

Significant interaction effect (at 0.01 and 0.05 levels) was found in three out of seven ANOVA employed for the Total sample. They are Retention - Analysis (F = 4.312*), Synthesis (F = 9.259**) and Evaluation (F = 5.997*).

Comparison of Retention Between the Experimental and Control Groups

All of the Post-hoc Comparisons (Scheffe' Test) done, wherever needed, showed significant difference in the mean Retention scores of the Experimental and Control groups, for the Total sample. The F-values obtained in the Scheffe' Test are arranged in the decreasing order of magnitude and presented.

Dependent Variable	Groups Compared	F-value
Knowledge	CLS - CMT	27.39**
Application	CLS - CMT	18.44**
Retention (Total)	CLS - CMT	12.82**
Comprehension	CLS - CMT	6.10*
Synthesis	CLS - CMT	4.96*

* Significant at 0.05 level
** Significant at 0.01 level
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

In all of these comparisons, Cooperative Learning Strategy was found accountable for the significant difference between the two groups (CLS and

CMT) in terms of the Retention power, as it created higher mean Retention scores in favour of the Experimental group.

Comparison of the Retention scores based on the two levels of Classroom Environment (AACE and BACE) was avoided, because none of the F-values obtained for the main effect of Classroom Environment on Retention (Objectivewise and Total score) of the Total sample was significant.

5.2.7.2. ANOVA for Retention by Instructional Learning Strategies by Classroom Environment for Boys

To study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) of Boys, seven ANOVA were employed. In the following sub-sections, the results of these seven ANOVA are discussed briefly.

Main Effect of Instructional Learning Strategies on Retention

Significant F-values were obtained for the main effect of Instructional Learning Strategies on Retention - Total score and on the Objectives Knowledge, Application, Comprehension and Synthesis for Boys. These significant F-values are presented in the descending order as in the break up.

Dependent Variable	F-value
Application	8.19**
Knowledge	6.95*
Synthesis	6.07*
Retention (Total)	4.82*
Comprehension	4.16*

* Significant at 0.05 level
** Significant at 0.01 level

Significant F-values were not obtained for the Objectives Analysis and Evaluation.

Main Effect of Classroom Environment on Retention

No significant main effect of Classroom Environment on Retention (Objectivewise and Total score) was noted.

Interaction Effect of Instructional Learning Strategies and Classroom Environment on Retention

Significant interaction effect was found only in one ANOVA (Retention - Synthesis F = 4.825) out of seven employed for Boys.

Comparison of Retention Between the Experimental and Control Groups

For Boys, all of the Post-hoc Comparisons (Scheffé Test) yielded significant difference in the mean Retention scores of the Experimental and Control groups. The F-values obtained are arranged in the descending order and presented in the break up.

Dependent Variable	Groups Compared	F-value
Knowledge	CLS - CMT	8.75**
Application	CLS - CMT	7.24**
Retention (Total)	CLS - CMT	4.54*
Comprehension	CLS - CMT	3.23•
Synthesis	CLS - CMT	2.73♦

* Significant at 0.05 level
** Significant at 0.01 level
• Significant at 0.10 level
♦ Significant at 0.25 level
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Cooperative Learning Strategy was found to create higher mean Retention scores in all of the Scheffé Tests. It proves the effectiveness of CLS over CMT.

Comparison between the two levels of Classroom Environment (AACE and BACE) was not needed, because Classroom Environment has not produced any significant F-values for the main effect on Retention (Objectivewise and Total score).

5.2.7.3. ANOVA for Retention by Instructional Learning Strategies by Classroom Environment for Girls

A brief description of the results of the seven ANOVA employed to study the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) of Girls are presented in this sub-section.

Main Effect of Instructional Learning Strategies on Retention

Significant F-values obtained for the main effect of Instructional Learning Strategies on Retention (in the Objectives Knowledge and Application) of Girls are presented in the descending order as follows.

Dependent Variable	F-value
Knowledge	14.44**
Application	5.24*

* Significant at 0.05 level
** Significant at 0.01 level

The F-values for Retention – Total score and for the Objectives Comprehension, Analysis, Synthesis and Evaluation were not found significant for Girls.

Main Effect of Classroom Environment on Retention

No significant F-values were observed for the main effect of Classroom Environment on Retention (Objectivewise and Total score) of Girls.

Interaction Effect of Instructional Learning Strategies and Classroom Environment on Retention

No significant F-values were found for the interaction effect of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score) of Girls.

Comparison of Retention Between the Experimental and Control Groups

Scheffe' Test yielded significant difference in the mean Retention scores of the Experimental and Control groups in all of the comparisons. The F-values are presented in the descending order as follows.

Dependent Variable	Groups Compared	F-value
Knowledge	CLS - CMT	18.81**
Application	CLS - CMT	6.47*

* Significant at 0.05 level
** Significant at 0.01 level
CLS - Cooperative Learning Strategy
CMT - Conventional lecture Method of Teaching

Higher mean Retention scores were found to attach with the Experimental group (to which CLS used). It shows the superiority of the Experimental group over the Control group (to which CMT used) in terms of Retention.

As Classroom Environment has no significant main effect on Retention (Objectivewise and Total score), comparison between the two levels of Classroom Environment (AACE and BACE) was not done.

5.2.8. CONCLUSION OF THE RESULTS OF ANOVA

To study whether Achievement and Retention (Objectivewise and Total score) change or not according to the change in the levels of the Independent Variables (Instructional Learning Strategies and Classroom Environment), Two-Factor ANOVA was used. The results of the ANOVA are concluded in this sub-section.

For the main effect of the Instructional Learning Strategies on ***Achievement*** (Objectivewise and Total score), ***11 ANOVA*** yielded significant F-values out of ***21 employed*** (seven each for Total sample, Boys and Girls). ***Four ANOVA*** each for Total sample and Girls and ***three ANOVA*** for Boys yielded significant main effect. It indicates that when Instructional Learning Strategy was changed, corresponding change in student Achievement (relevant Objectives and Total score) was observed in the Total sample, Boys and Girls.

Scheffé Test of Post-hoc Comparison revealed that Cooperative Learning Strategy caused this difference as it created higher mean Achievement scores than the Conventional lecture Method of Teaching.

For the main effect of Classroom Environment on Achievement (Objectivewise and Total score) of the Total sample, Boys and Girls, ***no significant F-values*** were observed in any of the ANOVA out of 21 employed (seven each for Total sample, Boys and Girls). It revealed the fact that, student Achievement (Objectivewise and Total score) was not depended upon the change in the levels of Classroom Environment for the Total sample, Boys and Girls.

No significant F-values were noted for the interaction effect of Instructional Learning Strategies and Classroom Environment on Achievement (Objectivewise and Total score) for the Total sample, Boys and Girls. Hence it can be assumed that, the combined effect of Instructional Learning Strategies and Classroom Environment has not affected the Achievement (Objectivewise and Total score) of the Total sample, Boys and Girls.

Significant main effect of the Instructional Learning Strategies on ***Retention*** was found in ***12 out of 21 ANOVA*** undertaken (seven each for Total sample, Boys and Girls). ***Five ANOVA each*** for the Total sample and Boys and ***two ANOVA*** for Girls yielded significant main effect. These results indicate that, variation in Instructional Learning Strategies caused difference in Retention (relevant Objectives and Total score) of the Total sample, Boys and Girls. Scheffé Test of Post-hoc Comparison revealed that Cooperative Learning Strategy was accountable for this difference as it caused higher Retention scores when compared to Conventional lecture Method of Teaching.

No significant main effect of Classroom Environment on Retention (Objectivewise and Total score) was noted in the Total sample, Boys and Girls. It indicates that Retention of the Total sample, Boys and Girls were independent of the change in the levels of Classroom Environment.

and Classroom Environment

Significant interaction effect of Instructional Learning Strategies on Retention (Objectivewise and Total score) was found in ***three out of seven ANOVA*** employed for the Total sample, in ***one out of seven*** for Boys and in ***none out of seven*** for Girls. It can be inferred from these result that, the interaction effect of the Instructional Learning Strategies and Classroom Environment has influenced the Retention (relevant Objectives) of the Total sample and has not influenced the Retention of Boys and Girls remarkably.

5.3. TENABILITY OF HYPOTHESES

In this section, the tenability of the hypotheses set for the present study are examined on the basis of the major findings.

The first hypothesis states that

5.3.1. ***There will be no significant difference in the mean Achievement scores (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls***

It was found that there was significant difference in the mean Achievement scores; Total and Objectivewise namely Knowledge, Comprehension, Application, Synthesis and Evaluation for the Total sample, Achievement - Total and in the Objectives Knowledge and Application for Boys and Achievement - Total and Objectivewise scores in Knowledge, Comprehension, Application and Synthesis for Girls, between the Experimental and Control groups. Thus, ***six out of seven*** comparisons done for the Total sample, ***three out of seven*** for Boys and ***five out of seven*** for Girls (***Altogether 14 out of 21 comparisons***) yielded significant difference in the mean Achievement scores of the Experimental and Control groups. Thus the first hypothesis is rejected.

The second hypothesis states that

5.3.2. ***There will be no significant difference in the mean Gain scores of the Experimental and Control groups for the Total sample, Boys and Girls***

Significant difference in the mean Gain scores of the Experimental and Control groups was found for the Total sample, Boys and Girls. Therefore, the second hypothesis is rejected.

The third hypothesis states that

5.3.3. ***There will be no significant difference in the mean Retention scores (Objectivewise and Total score) of the Experimental and Control groups for the Total sample, Boys and Girls***

Significant difference was found between the Experimental and Control groups with regard to the mean Retention scores; Total and Objectivewise namely Knowledge, Comprehension, Application and Synthesis for the Total sample, Retention - Total and Objectivewise namely Knowledge and Application for Boys and Girls. In short, ***five out of seven*** comparisons done for the Total sample and ***three each out of seven each*** for Boys and Girls (***Altogether 11 out of 21 comparisons***) yielded significant difference in the mean Retention scores of the Experimental and Control groups. Thus the third hypothesis is rejected.

The fourth hypothesis states that

5.3.4. ***Pupils taught through Cooperative Learning Strategy will not differ significantly from pupils taught through Conventional lecture Method of Teaching in terms of Achievement in Malayalam Language of standard VII pupils***

Twenty eight ANCOVA followed by Scheffe' Test of Post-hoc Comparison were done for the Total sample, to test this hypothesis. Significant difference in Achievement (relevant Objectives and Total score) between the Experimental and Control groups was found in ***17 out of 28 ANCOVA employed.*** All of the Post-hoc Comparisons revealed significant difference in the adjusted criterion means of the Experimental and Control groups. In all of these comparisons, higher mean Achievement scores were seen to associate with the Experimental group to which Cooperative

Learning Strategy was implimented. Thus the Cooperative Learning Strategy proved its advantage over the Conventional lecture Method of Teaching with regard to Achievement. Hence the fourth hypothesis is rejected.

The fifth hypothesis states that

5.3.5. ***Pupils taught through Cooperative Learning Strategy will not differ significantly from pupils taught through Conventional lecture Method of Teaching in terms of Retention in Malayalam Language of standard VII pupils***

Significant difference in Retention (relevant Objectives and Total score) of the Experimental and Control groups was found in ***16 out of 28 ANCOVA employed*** for the Total sample. Scheffé Test of Post-hoc Comparison done after ANCOVA also revealed significant difference in the adjusted criterion means. In all of the Scheffe' Tests, higher mean Retention scores were seen to attach with the Experimental group (to which Cooperative Learning Strategy was used) when compared to the Control group (to which Conventional lecture Method of Teaching was used). Thus the superiority of the Cooperative Learning Strategy over Conventional lecture Method of Teaching in terms of Retention was revealed. Hence the fifth hypothesis is rejected.

The sixth hypothesis was

5.3.6. ***There will be no significant main effects of the Independent Variables (Instructional Learning Strategies and Classroom Environment) on***

Achievement in Malayalam Language (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls

Significant main effect of Instructional Learning Strategies on Achievement was found in ***four out of seven ANOVA*** employed for the Total sample (Achievement - Total and Objectivewise namely Knowledge, Application and Synthesis). For Boys, ***three out of seven ANOVA*** done showed significant main effect (Achievement - Total and Objectivewise namely Knowledge and Application). For girls ***four out of seven ANOVA*** showed significant main effect (Achievement - Total and Objectivewise namely Knowledge, Application and Synthesis). ***Totally, 11 ANOVA out of 21 employed*** showed significant main effect of Instructional Learning Strategies on Achievement (relevant Objectives and Total score). ***No significant main effect*** of the Classroom Environment on Achievement (Objectivewise and Total score) was found in any of the ANOVA out of 21 employed (seven each for Total sample, Boys and Girls). Hence, the sixth hypothesis is rejected partially.

The seventh hypothesis states that

5.3.7. ***There will be no significant interaction effect of the Independent Variables (Instructional Learning Strategies and Classroom Environment) on Achievement in Malayalam Language (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls***

There were obtained ***no significant F-values*** in any of the ANOVA ***out of 21 employed*** (seven each for Total sample, Boys and Girls) for the interaction effect of the Instructional Learning Strategies and Classroom

Environment on Achievement (Objectivewise and Total score). Thus the seventh hypothesis is accepted fully.

The eighth hypothesis was

5.3.8. ***There will be no significant main effects of the Independent Variables (Instructional Learning Strategies and Classroom Environment) on Retention in Malayalam Language (Objectivewise and Total score) of standard VII pupils for the Total sample, Boys and Girls***

Ten ANOVA yielded significant main effect of Instructional Learning Strategies on Retention (Retention - Total and Objectivewise namely Knowledge, Comprehension, Application and Synthesis), in the Total sample and Boys (five each out of seven each employed). ***Another two out of seven ANOVA,*** yielded significant main effect of Instructional Learning Strategies on Retention (Objectivewise namely Knowledge and Application) in Girls. ***Totally 12 out of 21 ANOVA undertaken,*** yielded significant main effect of Instructional Learning Strategies on Retention (relevant Objectives and Total score).

None of the ANOVA out of 21 employed (seven each for Total sample, Boys and Girls) yielded significant main effect of Classroom Environment on Retention (Objectivewise and Total score) for the Total sample, Boys and Girls. Thus the eighth hypothesis is partially rejected.

The ninth hypothesis states that

5.3.9. ***There will be no significant interaction effect of the Independent Variables (Instructional Learning Strategies and Classroom Environment) on Retention in Malayalam Language (Objectivewise***

and Total score) of standard VII pupils for the Total sample, Boys and Girls

Three out of seven ANOVA employed for the Total sample (for the Objectives Analysis, Synthesis and Evaluation), ***one out of seven for Boys*** (for the Objective Synthesis) and ***none out of seven for Girls*** yielded significant F-values for the interaction effect of Instructional Learning Strategies and Classroom Environment on Retention (Objectivewise and Total score). Thus a total of ***four significant F-values (out of 21 ANOVA)*** were obtained. Hence the ninth hypothesis is accepted to a large extent.

5.4. EDUCATIONAL IMPLICATIONS OF THE STUDY

The present investigation was conducted mainly to study the effectiveness of Cooperative Learning (Jigsaw-II Model) over Conventional lecture Method in terms of Achievement and Retention in Malayalam Language of standard VII pupils. It was also aimed at finding out the main and interaction effects of Instructional Learning Strategies and Classroom Environment on Achievement and Retention in Malayalam Language. The major findings of the study and the conclusions drawn from the findings helped the investigator to make some suggestions which may help to improve the existing system of teaching language in the primary classes.

The major finding of the study revealed the ***effectiveness*** of Cooperative Learning Strategy (Jigsaw-II Model) over the Conventional lecture Method of Teaching. Pupils taught through Cooperative Learning Strategy were seen superior to pupils taught through the Conventional lecture Method of Teaching in terms of Achievement and Retention in Malayalam Language. As many past indepth studies reported, this might

be due to the lack of individual attention from the part of the teacher and individual participation from the part of the learners, in the Conventional whole class system. In the Cooperative Learning System, pupils learn through small Cooperative groups in which each member is accountable for the successful functioning of the group. The teacher-load is minimized so that, the teacher can get more time and convenience to listen each individual.

Allround development of the learner is considered as the basic aim of all educational systems. Development is not possible without interaction. The higher the interaction, the more the development. Higher classroom interaction (inter-group, intra-group and teacher-pupil) was observed in the Cooperative Classroom when compared to the Conventional Classroom. Hence, for the allround development (Social development, Psychological development, Emotional development, Cognitive development, etc.) of the learners, Cooperative Learning Strategies are more helpful than the Conventional Methods.

Through the Cooperative Learning Strategy, social skills such as mutual respect, democratic thinking, helping mentality, leadership quality, and conflict resolution are acquired as well as academic skills. Hence, the classroom is converted into a ***community of learners*** in its real meaning. Thus the classroom activities seem quite social and natural to the learners, the classroom becomes self disciplined and the teacher tension is minimized. Besides, small cooperative groups are easily manageable than the Conventional whole class.

Adopting Cooperative Learning Strategies with the existing curriculum, syllabus and text books is not easy. Because, they are constructed with a view to use with the Conventional Teaching Methods. To make them amenable to Cooperative Learning Strategies, modification should be made on them.

The syllabus and curriculum of the Teacher Training Courses (TTC, B.Ed., etc.) can also be modified so that, they include Cooperative Learning Methods. Training in Cooperative Learning Strategies can be made the integral part of teacher training programmes.

To make the serving teachers acquainted with the Cooperative Learning Strategies, inservice courses can be conducted. Workshops, demonstration classes etc. would help them to be familiar with various types of Cooperative Learning Strategies.

The existing syllabus and text books can also be made use for Cooperative Learning Strategies. For this, amenable topics have to be selected first. In the light of the suggestions made by educational researchers in this field, classroom activities can be preplanned, ie Lesson Transcripts can be prepared. No additional facilities are needed in the classroom except a slight change in the time duration of the periods and in the classroom organisation. Since, most of the Cooperative Learning Strategies include several activities progressing through different phases, short periods of time (say 45 minutes) may not be sufficient. By combining short periods to form sufficient durable periods, this problem can be solved. The amount of teaching material covered in a Cooperative Learning session (say 90 minutes) will be equal to the amount of material

covered in two Conventional class periods (of duration 45 minutes). So, the duration will not create any problem in covering the syllabus.

The classroom seating arrangement can be changed into a horse-shoe type, so that every pupil can see every pupil and the teacher in the classroom. It would create enough classroom space for the learners to mingle each other and thus the total classroom interaction is enhanced. Cooperative Learning Strategies can be used as supplementary to the Conventional Methods wherever possible.

Findings of the study further revealed that, Instructional Learning Strategies have main effect on student Achievement and Retention. Teachers can improve the outcomes of the learning process by making favourable change in the strategies of teaching. Cooperative procedures are one of the several choices.

The study also revealed that the existing Classroom Environment has no main effect on student Achievement and Retention. That is, the existing Classroom Environment is not proper so that it cannot affect the outcomes of the learning process. The Conventional Teaching Methods always provide non-conducive Learning Environment. By adopting newly developed, democratic Instructional Learning Strategies, the Classroom Environment can be made proper and supportive for learning and instruction.

When the combined effect of the Instructional Learning Strategies and Classroom Environment was examined in the study, some significant interaction effect were found on Retention. It might be due to the effect of the Cooperative Learning Strategy. Because, the Classroom Environment

created under Cooperative Learning Strategy is extremely democratic and social. Student Retention might be affected by the change in the Classroom Environment.

5.5. SUGGESTIONS FOR FURTHER RESEARCH

The findings of the present study made the investigator to suggest the following areas where further research works are strongly needed.

1. The study can be extended to the urban/rural or educationally backward/forward places of Kerala state.

2. Replication of the study using more classes in different schools and with different experimental designs such as Multiple-Group Pretest-Post test Design, Multiple-Group Time Series Design and Regression Discontinuity Design.

3. Replication of the study on higher levels such as High school classes or Higher secondary classes to examine the effectiveness of various Cooperative Learning Procedures.

4. The study can be extended to other disciplines such as Mathematics, Science etc.

5. Other Cooperative Learning Strategies (such as Teams-Games-Tournaments, Student Teams Achievement Divisions, Group Investigation, Team Assisted Individualisation, Numbered Heads Together and Complex Instruction) can be experimented.

6. The study can be extended to find out the relative effectiveness of Cooperative Learning Strategy on Achievement of the two sex groups.

7. Cooperative Learning Strategy can be compared with more than one other teaching methods.

8. Affective and Psychomotor outcomes of Cooperative Learning can be studied.

9. Other Covariates like Socio-Economic Status, Home Environment, Parent Involvement, etc. can be included and the effect can be controlled singly as well as in combination of two and three at a time.

10. The effectiveness of Cooperative Learning can be studied as a supplementary strategy to the Conventional Methods.

11. Teacher satisfaction with Cooperative Learning can be studied.

12. Effectiveness of one Cooperative Learning procedure can be compared with the effectiveness of other Cooperative Learning procedures.

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APPENDICES

Appendix II A

UNIVERSITY OF CALICUT
Department of Education

LESSON TRANSCRIPT FOR COOPERATIVE LEARNING
(Jigsaw II Model - Standard VII)

Dr. P.K. Sudheesh Kumar P. Sasidharan

Objectives

1. For knowing new words and new places.
2. For understanding new ideas.
3. For applying the learned knowledge in new context.
4. For analysing the ideas.
5. For learning by synthesising the ideas.
6. For developing the ability of self evaluation.
7. For developing cooperative attitude.
8. For developing mutual understanding and the ability of sharing the work.
9. For developing democratic values.
10. For developing creativity.

Learning aids

charts, dictionary, slips, sketch pen etc.

Time: 90 minutes.

Teacher enters into the class. Students greet him. The teacher also wishes them.

Phase I

Teacher : Let us start without a preface. Here I want to introduce a new method of teaching and find out the effectiveness of this method. There are some specialities in this method. Let us examine them. (Exhibits a chart in which the specialities of the new method are described and explains.)

1.	The whole class will turn into groups and learn.
2.	The lesson will be learned not as a whole but as different subunits.
3.	This is a self learning method, the teacher is only a guide.
4.	This method is based on your mutual cooperation, so it is helpful not only for understanding the context but also for assessing and developing your cooperative attitude.

Teacher : First of all we have to be divided into different groups. Count the numbers from 1, 2, 3, ... upto 7 from this side.

Students : 1, 2, 3, ... 7 (count).

Teacher : From the next, repeat the numbers 1, 2, 3, ... upto 7. (Thus, all students in the class are made to count.)

Students : (Participate with interest and curiosity.)

Teacher : Stand up those who counted the number '1'.

Students : (Stand)

Teacher : How many are standing?

Students : Seven.

Teacher : All right, you are the first group, take your seat.

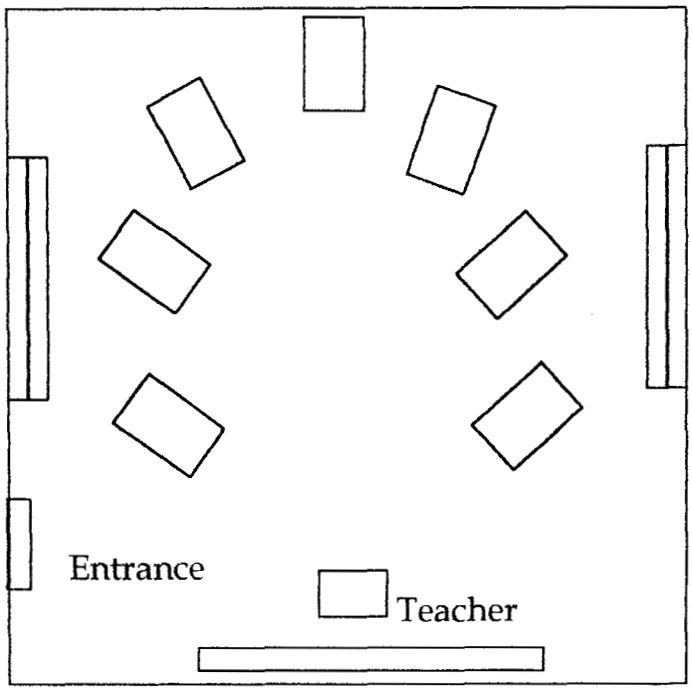
Students : (Sit.)

Teacher : How many of you counted the number '2'?

Students : (Stand)

Teacher : Here also seven students, you are the second group. Take that bench as your seat. (Like this, the teacher makes the whole class into seven groups.)

All right. Now we have to change our seating arrangement. Help me to arrange the seats. [Then with the cooperation of the students rearranges the seats.]



Classroom Seating Arrangement

Teacher : Do you feel any difference in this arrangement?

Students : Yes, every one can see every one.

Teacher : Now each group needs one leader. Within two minutes elect your leader.

Students : (Cooperate with interest.)

Teacher : Then we have to select a name for each group. Select from the names of tourist centres in Kerala.

Students : (Select names)

Teacher : Then the group leader stand up and introduce yourself and your group.

Students : (Introduce)

Teacher : Using the sketch pen write down the name of each group on the name board. (Distributes sketch pens.)

Students : (Cooperate with interest.)

(15 minutes for this much activities)

Teacher : All right. Listen here, here is a reading tool for you. (Exhibits the chart.)

There is a small travelogue in the chart.

My journey to Kozhikode

From Kozhikode bus stand we went straight to the beach by an autorickshaw. My younger sister and I were dancing with joy. We were seeing the sea for the first time. My father and mother have seen it many times before ! Upto that time our knowledge about the 'Sea' was got only by reading and hearing. Now that fact is roaring before our eyes. We were frightened. After some time our fear vanished. We cannot say how much time we spent there! We became sad when father told us that we could go. For making us happy father took us to a hotel and bought tea and pastry for us. Then we bought some clothes from a textile shop; pants and shirt for me, churidar for my sister and a sari for my mother. Father bought nothing for himself. I wished to buy a pair of shoes also. But I didn't tell it to the father. By 9 pm we reached home. When I went to bed I didn't think about my new shirt and pants. My mind was filled with the scene of the wonderful sea.

Teacher : This is a travelogue written by a student. Read it silently. 5 minutes time.

Students : (Read with enthusiasm)

Teacher : How is it?

Students : Very interesting.

Teacher : Have you visited a place like this?

Students : Yes! Yes!

Teacher : Which places?

Students : (Say the names of several places.)

Teacher : List out the nearby places that most of the students might have visited. (7 Numbers). Look at the board. Seven places nearby. In each group seven members are there. Aren't there? Each member has to prepare a travelogue, selecting a place they have gone to and give a title for that. Time 15 minutes.

Students : (Involve in the work with enthusiasm.)

Phase II

Teacher : (After 15 minutes) All right. We can stop. (Gives time to finish for those who are writing). Now, those who got the first place (Eg: Valanchery) stand up.

Students : (One member each from every group stands up.)

Teacher : These students wrote about the journey to Valanchery. Then you only group here. Now those who selected the second place stand up.

Students : (One member each from every group stands up.)

Teacher : All right. You group here. [Thus new seven groups (Expert groups) are formed by uniting the students who got the same place]. Do you know why I form the new groups?

Students: No, we don't.

Teacher : All right. I will say. This is the occasion for improving the travelogue you have prepared. Each member of the group should read out his/her travelogue to the other members and discuss it. You can add the missing points according to your imagination, improve the language by correcting the mistakes and improve the title. (15 minutes time).

Students: (Cooperate in the group work.)

Teacher : (For making the group work active interferes wherever needed.)

Phase III

Teacher : (After 15 minutes) All right. You might have improved your description. Now you can return to your base group.

Students : (Return to the base group).

Teacher : Now, each group has prepared seven travelogues. Now read out the travelogue mutually and discuss it. Thus, select the best one from those seven. Try to improve it. Time 20 minutes.

Students : (Cooperate in the group work.)

Teacher : (Gives suggestions whenever needed. Interferes for making the group work active - After 20 minutes] All right. Have you selected the best travelogue?

Students : Yes.

Phase IV

Teacher : Now how many travelogues were selected?

Students : Seven.

Teacher : All right. Now, from these seven we have to select the best one. For this, what have we to do?

Students : They should be read out.

Teacher : Yes. The selected travelogues should be read out by one member of every group. Then what should the others do?

Students : Listen.

Teacher : Then?

Students : Points should be given.

Teacher : What should be the basis of giving points?

Students : (Different opinions are expressed. At last with the help of the teacher, it is decided to give total 10 points to each group on the basis of language, imagination, intensity of experience, ability of expression, observation skill.)

Teacher : All right. Let us start. Read out the travelogue of the first group.

Students : (One student reads. Others listen and give points. Like this all the groups read their travelogue. Others give points. 10 minutes is taken for this activity.)

Teacher : Yes. Now we can find out the selected travelogue. Which travelogue is selected by the first group?

Students : (Each group reveals the travelogue they have selected. It is decided that the travelogue selected by the majority of the groups will be the best one. Selected group is appreciated and given a prize).

Teacher : All right. Now this class ends. We shall meet in the next class. [20 minutes time for phase IV).

[Total time 90 minutes]

Appendix II B

UNIVERSITY OF CALICUT
Department of Education

LESSON TRANSCRIPT FOR COOPERATIVE LEARNING
(Jigsaw II Model - Standard VII)

Dr. P.K. Sudheesh Kumar **P. Sasidharan**

Time: 90 minutes

Teacher enters into the class and the students greet him. The teacher also greets them.

Phase I

Teacher : How was our work in the last class?

Students : Very interesting.

Teacher : What is the speciality of our new learning method ?

Students : All have to do some work. The work is done not individually but in groups. Moreover this is a self learning method. (After that students frankly express their views.)

Teacher : Yes. First what we have to do?

Students : We have to split into groups.

Teacher : Yes. Today we will be grouped in a new method. Each one come here and take a slip from this box.

Students : (Cooperate with curiosity.)

Teacher : (To one student) What is written in your slip?

Students : Malampuzha.

Teacher : All right. 'Did anyone else get Malampuzha?'

Students : (Other six pupils also stand up.)

Teacher : They belong to 'Malampuzha' group. (To another one) What is written in the slip?

Students : Vazhachal.

Teacher : All right. 'Did anyone else get 'Vazhachal'?'

Students : (Other six pupils also stand up.)

Teacher : (Thus all students in the class are divided into seven groups in the names of tourist centres in Kerala.) Now seven groups are formed. Each group has its own name. Then what have we to do?

Students : Elect the group leader.

Teacher : Yes. Each group has to elect one leader within one minute. Give a chance to those who could not become leader in the last class.

Students : (Cooperate with interest.)

Teacher : Then what has to be done?

Students : To introduce group leaders, write down the name of the group on the name board.

Teacher : All right. That can be finished within one minute.

Students : (Participate with interst in the work.)

Teacher : What work was done in the last class?

Students : All of us prepared a travelogue each. From those we selected the best one.

Teacher : How were the travelogues?

Students : Very interesting.

Teacher : Have you read anyother travelogues?

Students : ('Yes' and 'No' answers come. A small discussion takes place.)

Teacher : All right. Do you want to read a new travelogue?

Students : Yes ! Yes !

Teacher : Here is an opportunity for that. Do you know the place of the journey?

Students : (Silence)

Teacher : All right. Look at the chart. (Exhibits the chart.)

(Content of the chart.)

"If there is a heaven in the earth it is here, it is here, it is here" - Nehru.

Students : (Read the chart with curiosity.)

Teacher : Which is that heaven?

Students : (Silence)

Teacher : Yes. Look at this chart ! (Exhibits another chart.)

(Content of the chart)

"India and Pakistan have been arguing for the ownership of this place which is famous for its natural beauty and can earn a lot through tourism."

Students : (Read the chart with curiosity.)

Teacher : Which is that place?

Students : Kashmir ! ..... Kashmir ..... !

Teacher : What is the speciality of that place?

Students : (Silence)

Teacher : Is there anyone in the class who has seen Kashmir?

Students : (Silence)

Teacher : Has anyone told you about Kashmir?

Students : (Silence)

Teacher : Yes. Then a description of the journey through Kashmir will be a new experience. Won't be?

Students : Yes !

Teacher : From where shall we get the description about Kashmir ?

Students : (Within this time the students would have found out the lesson titled 'Through the Valley of Kashmir' from the text book.) - It is in page 104 in the text book !

Teacher : Yes, who wrote this ?

Students : D. Babu Paul.

Teacher : Who is he?

Students : (Silence.)

Teacher : Now he is working as the Additional Chief Secretary to the Government of Kerala. This travelogue is very long. Then what can we do?

Students : It can be divided into subunits and read.

Teacher : All right. Let, from the starting of the lesson to . ..... "Thus the Kashmiri overcomes the coldness"- be today's section for learning. First of all, read the whole lesson in the group. Each member should read a little portion in turn and the others should listen. After that read today's subunit once again.

Students: (Read)(Take 15 minutes for this activity.)

Teacher : (After reading, distributes 7 slips each to all the groups.) Distribute these slips to each member. Each member in the group has to do the work written in it. (In each slip different learning section is indicated as follows.)

1. Make as many questions as possible from today's section; find out their answers.

2. Find out difficult words (New words) Guess their meaning from the context. With the help of the dictionary on the table and the teacher, check whether the meaning you have found out is correct.

3. From the activities given on page 109 of the text book, 'find out and tell', 'find out and write', 'think and tell' - these works have to be done selecting those related to today's section.

4. From the activites given in the text book (page 109), 'find out the substitute for the word from the lesson', 'split the word' (page 110), these activities have to be done.

5. Do the activity 'replace and write' given in page 110 in the text book. Find out at least 4 words for each model.

6. After finding out the sentences including the words; shining, destroyed completely, and unbearable, write down those in your note book. Using these words frame 2 sentences each.

7. Prepare a small description in your language (A paragraph each) - Mughal garden, Woolar lake, A festival in which you have participated.

Teacher: 15 minutes can be taken for this activity.

Students: (Involve in thier own activities with interest.)

Teacher: (Makes the group work active through proper interference. Makes sure that all students finish their work within 15 minutes.)

Phase II

Teacher	:	All right. We can stop. Now look at the other side of your slip. What do you see?
Students	:	A number.
Teacher	:	Yes. Those who got the number '1', group here.
Students	:	(Group with interest.)
Teacher	:	What was the work for you?
Students in the first group	:	Make as many questions as possible and find out their answers.
Teacher	:	Yes. You are going to become an expert group in that activity. Improve your work result through discussion and mutual cooperation. Now which is the second group?
Students	:	(Form the second group.)
Teacher	:	What was your work?
Stduents	:	To find out new words and their meaning.
Teacher	:	All right. Your are also an expert group. Find out more through mutual cooperation. Find out the possibility of different meanings of the same word and opposite word.
Students	:	(Involve in group effort.)
Teacher	:	(Thus splits the students in the whole class into 7 expert groups.) You can take 10 minutes.

Phase III

Teacher	:	All right. We can stop this discussion here. Now you can return to the base group.
Students	:	(Return to the base group.)
Teacher	:	Each one in the base group has become an expert in their own section. Now it is the time for sharing your knowledge with others. Starting from the first member each one of the group tutor the others. ie, you teach yourselves. (Explains to those students who didn't understand.) For this work 30 minutes time can be taken.
Students	:	(Involve in the group work.)

Phase IV

Teacher	:	(After 30 minutes) Yes. Now here is a discussion among the groups. In the form of a competition. Thus we can find out the group which has done the work perfectly. Groups can also question mutually. Select the best question. One point each for one question and one answer. Only one chance for one member.
Students	:	(Participate in the quiz programme with interest. Teacher interferes whenever needed, gives proper suggestions. During these activities the teacher deliberately interferes and introduces ideas that the students have omitted or that have not come to their attention. Finishes this activity within 15 minutes. Appreciates the winning group, gives prizes.)
Teacher	:	The next activity is to write the central idea of the reading section in a sentence. Find out the central idea through group discussion. After that each member gives a title to the section. Discuss in your group and select the best title from the group. 5 minutes can be used.
Students	:	(Involve in the individual effort.)
Teacher	:	(After 5 minutes) Time is over. Each member from each group can stand up and read the central idea and the suggested title. (In the introductory stage make sure that each student gets an opportunity.)
Students	:	(Suggest the title. Read out the central idea.)
Teacher	:	All right. Today's class ends here. We shall meet in the next class.

(Time - Total 90 minutes)

Appendix III

UNIVERSITY OF CALICUT

Department of Education

LESSON TRANSCRIPT FOR CONVENTIONAL LECTURE METHOD OF TEACHING

അധ്യാപകന്റെ പേര്	:	പി.ശശിധരൻ
ക്ലാസ്സ്	:	7
വിഷയം	:	മലയാളം
പാഠം	:	കാശ്മീർ താഴ്വരയിൽ
പാഠ്യഭാഗം	:	ആദ്യത്തെ നാലു ഖണ്ഡിക
സമയം	:	45 മിനുട്ട്

I. മുന്നറിവ് :

കുട്ടി, അടുത്തുള്ള ചില വിനോദസഞ്ചാരകേന്ദ്രങ്ങൾ സന്ദർശിച്ചിട്ടുണ്ട്. ഇന്ത്യയിലെ പ്രശസ്ത വിനോദസഞ്ചാരകേന്ദ്രമായ കാശ്മീരിനെക്കുറിച്ച് കേട്ടിട്ടുണ്ട്. കുട്ടികൾക്കുവേണ്ടിയുള്ള ചില യാത്രാവിവരണങ്ങൾ വായിച്ചിട്ടുണ്ട്. പദങ്ങളുടെ വിവിധ രൂപങ്ങൾ കണ്ടുപിടിക്കുന്നതിൽ പരിചയമുണ്ട്. വ്യാകരണ കാര്യമായല്ലാതെ പദങ്ങൾ വിഗ്രഹിച്ച് അർത്ഥം ഗ്രഹിക്കുന്നതിലും ശരിയായ രീതിയിൽ സന്ധിചെയ്ത് എഴുതുന്നതിലും പരിചയം നേടിയിട്ടുണ്ട്.

II വിഷയാപഗ്രഥനം :

എ. വസ്തുതകൾ :

ഇപ്പോൾ കേരളസർക്കാറിന്റെ അഡീഷണൽ ചീഫ് സെക്രട്ടറിയായ ഡി.ബാബുപോൾ, തന്റെ കാശ്മീർ യാത്രയെക്കുറിച്ച് എഴുതുന്നു. സമുദ്രനിരപ്പിൽ നിന്ന് അയ്യായിരം അടി ഉയരത്തിൽ സ്ഥിതിചെയ്യുന്ന കാശ്മീരിലാണ് ഇന്ത്യയിലെ ഏറ്റവും വലിയ ജലാശയം-വൂളാർ-സ്ഥിതി ചെയ്യുന്നത്. വൂളാർ തടാകത്തിന് നിരവധി പ്രത്യേകതകളുണ്ട്. വൂളാറിലേക്കുള്ള യാത്രക്കിടയിൽ കടന്നുപോകുന്ന 'പട്ടൻ' എന്ന സ്ഥലം, ശങ്കരവർമ്മൻ ഭരിച്ചിരുന്ന കാലത്ത് കാശ്മീരിന്റെ തലസ്ഥാനമായിരുന്നുവത്രേ. മാനസബൽ എന്ന ചെറിയ തടാകത്തിനടുത്തുള്ള ഖീർഭിവാനി എന്ന പുണ്യസ്ഥലത്ത്, പ്രഭാതത്തിലും പ്രദോഷത്തിലും നിറം മാറുന്ന ഒരു വിശേഷപ്പെട്ട നീരുറവയുണ്ടത്രേ.

ബി. പദങ്ങൾ :

ഉപരിഭാഗം, പ്രാചീനം, അത്യുഗ്രം, അണിനിരക്കുക, അച്ഛസ്ഫടികസങ്കാശം.

സി. സന്ധി :

അത്യുഗ്രം

III ഉദ്ദേശ്യങ്ങൾ :

1. പാഠാപഗ്രഥനത്തിൽ സൂചിപ്പിച്ച വസ്തുതകൾ മനസ്സിലാക്കുന്നു.

2. പുതിയ വസ്തുതകൾ, പദങ്ങളുടെ അർത്ഥം, പ്രയോഗങ്ങൾ തുടങ്ങിയവ ഗ്രഹിക്കുന്നു.

3. സന്ധിമാതൃകളെക്കുറിച്ചുനേടുന്ന അറിവ് നൂതനസന്ദർഭങ്ങളിൽ പ്രയോഗിക്കുന്നു.

4. ചില ഭാഷാപ്രയോഗങ്ങൾ അപഗ്രഥിച്ച് (ഉദാ: അച്ഛസ്ഫടികസങ്കാശം), അവ പാഠസന്ദർഭത്തിന് എത്രമാത്രം അനുയോജ്യമാണെന്നു കണ്ടെത്തുന്നു.

IV പഠനോപകരണങ്ങൾ :

പാഠപുസ്തകം, പാഠപുസ്തകത്തിലെ ചിത്രങ്ങൾ, മറ്റു ചില ചിത്രങ്ങൾ തുടങ്ങിയവ.

പാഠ്യവസ്തു	സ്പഷ്ടീകരണം	പഠനാനുഭവങ്ങൾ	മൂല്യനിർണയം
1. സജ്ജീകരണം നാം മിക്കവരും ചില വിനോദ സഞ്ചാര കേന്ദ്രങ്ങൾ സന്ദർശിച്ചിട്ടുണ്ട്. നമ്മൾ അതിനെക്കുറിച്ച് മറ്റുള്ളവരോട് പറയാറുമുണ്ട്.	അനുസ്മരിക്കുന്നു	അടുത്തുള്ള വിനോദസഞ്ചാരകേന്ദ്രങ്ങളെക്കുറിച്ച് ഒരു ലഘുചർച്ച. അവ സന്ദർശിച്ചിട്ടുള്ളവർക്ക് അതിനെക്കുറിച്ച് പറയാൻ അവസരം നൽകുന്നു. ചർച്ചയ്ക്കൊടുവിൽ കാശ്മീരിനെക്കുറിച്ച് ബാബുപോൾ എഴുതിയ യാത്രാ വിവരണത്തിൽ എത്തുന്നു, അതുവഴി 'കാശ്മീർ താഴ്വരയിൽ' എന്ന പാഠത്തിലും.	
2. മാതൃകാവായന	ഏകാഗ്രമായി ശ്രദ്ധിക്കുന്നു	അധ്യാപകൻ പാഠഭാഗം ഉച്ചാരണസ്ഫുടതയോടെയും ആശയവ്യക്തതയോടെയും വായിക്കുന്നു	
3. മൗനവായനയും സാമാന്യമായ ആശയഗ്രഹണവും കാശ്മീർ താഴ്വരയെക്കുറിച്ച് ഡി. ബാബുപോൾ എഴുതിയ യാത്രാവിവരണം കാശ്മീരിലെ വൂളാർ,മാനസബൽ എന്നീ തടാകങ്ങളെക്കുറിച്ചും, പട്ടൻ, ഖീർഭിവാനി എന്നീ സ്ഥലങ്ങളെക്കുറിച്ചുമുള്ള പരാമർശങ്ങൾ.	മൗനമായി വായിച്ച് ആശയങ്ങൾ സാമാന്യമായി കണ്ടുപിടിക്കുന്നു.	കുട്ടികൾ പാഠഭാഗം മൗനമായി വായിക്കുന്നു. പ്രധാനാശയങ്ങൾ സ്വയം കണ്ടുപിടിക്കാൻ അധ്യാപകൻ മുൻകൂട്ടി നിർദ്ദേശം നൽകുന്നു. ചിത്രങ്ങളുടെ സഹായത്തോടെ, പ്രയാസമുള്ള ഭാഗങ്ങൾ വിശദീകരിക്കുന്നു	1. ഈ യാത്രാവിവരണം എഴുതിയതാരാണ് ? 2. ഇന്ത്യയിലെ ഏറ്റവും വലിയ ജലാശയമേത് ? 3. ശങ്കരവർമൻ ഭരിച്ചിരുന്ന കാലത്ത് കാശ്മീരിന്റെ തലസ്ഥാനമേതായിരുന്നു ? 4. ഖീർഭിവാനിയിലെ നീരുറവയുടെ പ്രത്യേകതയെന്ത് ?

പാഠ്യവസ്തു	സ്പഷ്ടീകരണം	പഠനാനുഭവങ്ങൾ	മൂല്യനിർണയം
4. സൂക്ഷ്മപഠനം പദങ്ങൾ	സമാനപദങ്ങൾ കണ്ടെത്തുന്നു. അർത്ഥം കണ്ടുപിടിക്കുന്നു.	ഉപരിഭാഗം, അത്യുഗ്രം, അണിനിരക്കുക, അച്ഛസ്ഫടികസങ്കാശം തുടങ്ങിയ പദങ്ങളുടെ അർത്ഥം കുട്ടികൾ അധ്യാപകന്റെയും, പാഠപുസ്തകത്തിന്റെയും സഹായത്തോടെയും കണ്ടെത്തുന്നു. വിപരീത പദം കണ്ടെത്താവുന്ന പദങ്ങൾക്ക് അവ (ഉദാ : ഉപരിഭാഗം X അധോഭാഗം; പ്രാചീനം X നവീനം) കണ്ടെത്തുന്നു	അർത്ഥം പറയുക ഉപരിഭാഗം, അത്യുഗ്രം, അച്ഛസ്ഫടികസങ്കാശം വിപരീതപദം പറയുക ഉപരിഭാഗം, പ്രാചീനം
സന്ധി അത്യുഗ്രം അതി + ഉഗ്രം	പദങ്ങൾശരിയായി സന്ധിചെയ്യുന്നു, പിരിച്ചെഴുതുന്നു	അത്യുഗ്രം - അതി+ഉഗ്രം - ഈ പദത്തെ ഇങ്ങനെ പിരിച്ചെഴുതുന്നു. ഇത്തരത്തിൽ കൂടുതൽ പദങ്ങൾ പിരിച്ചെഴുതാൻ കുട്ടികളോട് ആവശ്യപ്പെടുന്നു. (ഉദാ:- അത്യത്ഭുതം - അതി+ അത്ഭുതം)	പിരിച്ചെഴുതുക. അത്യുഗ്രം അത്യത്ഭുതം
5. കുട്ടികളുടെ ശ്രാവ്യ വായന	ഉച്ചാരണശുദ്ധിയോടെയും ആശയ വ്യക്തതയോടെയും വായിക്കുന്നു.	ഏതാനും കുട്ടികൾ പാഠഭാഗം വായിക്കുന്നു. മറ്റുള്ളവർ ശ്രദ്ധിച്ചിരിക്കുന്നു. അധ്യാപകൻ, വേണ്ട സ്ഥലങ്ങളിൽ ഉചിതമായ നിർദ്ദേശങ്ങൾ നൽകുന്നു.	
6. പുനരവലോകനം (ചോദ്യങ്ങൾ)		1. വൂളാർ തടാകത്തിന്റെ ഉത്ഭവത്തെക്കുറിച്ചുള്ള ഐതിഹ്യമെന്ത് ? 2. കാശ്മീരിലെ പ്രധാന ജലാശയങ്ങൾ ഏതെല്ലാം ? 3. കാശ്മീരിലെ 'പട്ടൻ' എന്ന സ്ഥലത്തിന്റെ ചരിത്രപരമായ പ്രാധാന്യമെന്ത് 4. മാനസബൽ തടാകത്തിലെ ജലത്തിന്റെ സവിശേഷതയെന്ത് ? 5. അർത്ഥം പറയുക - അച്ഛസ്ഫടികസങ്കാശം, ഉപരിഭാഗം 6. വിപരീതപദം പറയുക - ഉപരിഭാഗം, പ്രാചീനം 7. പിരിച്ചെഴുതുക - അത്യുഗ്രം, അത്യാധുനികം, അത്യത്ഭുതം	
7. നിർദ്ദിഷ്ടാഭ്യാസം		പുനരവലോകനഘട്ടത്തിലെ ചോദ്യങ്ങൾ, നിർദ്ദിഷ്ടാഭ്യാസമായിക്കൊടുക്കുന്നു.	

Appendix IV

UNIVERSITY OF CALICUT
DEPARTMENT OF EDUCATION

CLASS ROOM ENVIRONMENT INVENTORY
(PRIMARY LEVEL)

Dr. Kamala S. Pillai and Sunitha. P. P

പേര്:.....ക്ലാസ്സ്:.....ക്ലാസ്സ്നമ്പർ.....

സ്ത്രീ:..... .....ആൺകുട്ടി/പെൺകുട്ടി..... .....

നിർദ്ദേശങ്ങൾ: താഴെ കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകളും നിങ്ങളുടെ ക്ലാസ്സ് മുറിയിലെ പഠനവുമായി ബന്ധപ്പെട്ട വയാണ്. ഓരോ പ്രസ്താവനകൾക്കും നേരെയും ഉണ്ട്/ഇല്ല എന്നിവ ഉത്തരം രേഖപ്പെടുത്താനുള്ള സ്ഥലം കൊടുത്തിട്ടുണ്ട്. ഉചിതമായ ഉത്തരത്തിനുനേരെ ബ്രാക്കറ്റിനുള്ളിൽ ശരി (√) എന്ന് അടയാളപ്പെടുത്തുക.

		ഉണ്ട് (അതെ)	ഇല്ല (അല്ല)
1	എന്റെ ക്ലാസ്സിലെ കുട്ടികളെല്ലാവരും എന്റെ കൂട്ടുകാരാണ്.	( )	( )
2	ക്ലാസ്സിലെ കുട്ടികളെല്ലാവരും ചേർന്ന് ഒരു ക്ലാസ്സ് ലീഡറെ തെരഞ്ഞെടുത്തിട്ടുണ്ട്.	( )	( )
3	ക്ലാസ്സിലെ കുട്ടികൾ തമ്മിൽ എല്ലാകാര്യങ്ങൾക്കും സഹായിക്കാറുണ്ട്.	( )	( )
4	ക്ലാസ്സിലെ മറ്റു കുട്ടികളോട് ഞാൻ സ്നേഹത്തോടുകൂടി പെരുമാറാറുണ്ട്.	( )	( )
5	ക്ലാസ്സിലെ കുട്ടികൾക്ക് എന്തെങ്കിലും ആവശ്യം വന്നാൽ ഞാൻ സഹായിക്കാറുണ്ട്.	( )	( )
6	പഠനകാര്യങ്ങളിൽ ക്ലാസ്സ് ലീഡർ ഞങ്ങൾക്ക് വേണ്ട നിർദ്ദേശങ്ങൾ തരാറുണ്ട്.	( )	( )
7	എന്റെ കൂട്ടുകാർ പഠനകാര്യങ്ങളിൽ എന്നെ സഹായിക്കാറുണ്ട്.	( )	( )
8	പഠനത്തിൽ പിടുരെയുള്ള കുട്ടികളെ ക്ലാസ്സിലെ മറ്റു കുട്ടികൾ അഭിനന്ദിക്കാറുണ്ട്.	( )	( )
9	എന്റെ കൂട്ടുകാർ എനിക്ക് തരുന്ന ഉപദേശങ്ങൾ ഞാൻ സ്വീകരിക്കാറുണ്ട്.	( )	( )
10	പഠനത്തിൽ പിന്നോക്കം വരുന്ന കുട്ടികളെ ഞങ്ങളുടെ ക്ലാസ്സിലെ മിടുക്കരായ കുട്ടികൾ സഹായിക്കാറുണ്ട്.	( )	( )

		ഉണ്ട് (അതെ)	ഇല്ല (അല്ല)
11	ക്ലാസ്സിലെ ചില കുട്ടികൾ തമ്മിൽ എപ്പോഴും വഴക്ക് ഉണ്ടാവാറുണ്ട്.	( )	( )
12	എന്റെ കൂട്ടുകാർ എനിക്കെതിരായി അഭിപ്രായം പറയുമ്പോൾ എനിക്ക് ദേഷ്യം വരാറുണ്ട്.	( )	( )
13	എന്റെ ക്ലാസ്സിലെ ഏതാനും ചില കുട്ടികളോട് ഞാൻ സംസാരിക്കാറില്ല.	( )	( )
14	എന്റെ കൂട്ടുകാർക്ക് എന്നെക്കാൾ മാർക്ക് കൂടുതൽ കിട്ടുമ്പോൾ വിഷമം ഉണ്ടാവാറുണ്ട്.	( )	( )
15	ക്ലാസ്സിലെ എന്റെ അടുത്ത കൂട്ടുകാർ തന്നെ എന്നോട് പിണങ്ങാറുണ്ട്.	( )	( )
16	പഠനപ്രവർത്തനങ്ങളെ സംബന്ധിച്ച് എന്റെ ക്ലാസ്സിലെ കുട്ടികൾ തമ്മിൽ വഴക്ക് ഉണ്ടാവാറുണ്ട്.	( )	( )
17	എന്റെ പുസ്തകം, പേന എന്നിവ ക്ലാസ്സിലെ മറ്റുകുട്ടികൾക്ക് ക്ലാസ്സിൽ ഉപയോഗിക്കാൻ കൊടുക്കാറില്ല.	( )	( )
18	ഗൃഹപാഠം ചെയ്യാതെ ക്ലാസ്സിൽ വന്നാൽ അധ്യാപകനിൽനിന്ന് ശിക്ഷ കിട്ടാറുണ്ട്.	( )	( )
19	ക്ലാസ്സ് ലീഡറുമായി ക്ലാസ്സിലെ കുട്ടികൾ വഴക്ക് ഉണ്ടാക്കാറുണ്ട്.	( )	( )
20	അധ്യാപകൻ വഴക്ക് പറയുമ്പോൾ വിഷമം തോന്നാറുണ്ട്.	( )	( )
21	ക്ലാസ്സ് മുറിയുടെ പുറത്തുനിന്നുള്ള ശബ്ദങ്ങൾ പഠനത്തിന് ശല്യമാവാറുണ്ട്.	( )	( )
22	അധ്യാപകൻ കൂടുതലായി ഗൃഹപാഠം തരുമ്പോൾ ആ വിഷയത്തോട് വെറുപ്പ് തോന്നാറുണ്ട്.	( )	( )
23	എന്റെ ക്ലാസ്സിലെ ഭൂരിപക്ഷം കുട്ടികൾക്കും പഠനപ്രവർത്തനങ്ങളിൽ പ്രയാസം അനുഭവപ്പെടാറുണ്ട്.	( )	( )
24	ചില പാഠ്യവിഷയങ്ങൾ പഠിക്കാൻ കൂടുതൽ പ്രയാസം തോന്നാറുണ്ട്.	( )	( )
25	ബ്ലാക്ക്ബോർഡിലെഴുതിയ പാഠഭാഗങ്ങൾ വ്യക്തമായി കാണാൻ കഴിയാത്തതുകൊണ്ട് പഠനത്തിന് ബുദ്ധിമുട്ട് അനുഭവപ്പെടാറുണ്ട്.	( )	( )
26	പഠിക്കാൻ പ്രയാസം തോന്നുന്ന പാഠഭാഗങ്ങൾ പഠിക്കാതെ വിട്ടുകളയാറുണ്ട്	( )	( )

		ഉണ്ട് (അതെ)	ഇല്ല (അല്ല)
27	അധ്യാപകൻ പാഠഭാഗങ്ങൾ വേഗത്തിലെടുക്കുമ്പോൾ മനസ്സിലാക്കാൻ ബുദ്ധിമുട്ട് തോന്നാറുണ്ട്.	( )	( )
28	പ്രയാസമുള്ള പാഠങ്ങൾ പഠിപ്പിക്കുമ്പോൾ അധ്യാപകൻ ഞങ്ങൾക്ക് പഠിക്കാൻ എളുപ്പവഴികൾ പറഞ്ഞുതരാറുണ്ട്.	( )	( )
29	വിഷമമുള്ള പാഠങ്ങൾ പഠിക്കാൻ കൂടുതൽ സമയം ചെലവഴിക്കാറുണ്ട്.	( )	( )
30	പഠനത്തിൽ പിന്നോക്കം വരുന്ന കുട്ടികളെ അധ്യാപകൻ പ്രത്യേകം ശ്രദ്ധിച്ച്, അവരെ സഹായിക്കാറുണ്ട്.	( )	( )
31	എന്റെ ക്ലാസ്സിലെ എല്ലാ കുട്ടികളും പഠിക്കാൻ താല്പര്യം ഉള്ളവരാണ്.	( )	( )
32	ക്ലാസ്സിലെ കുട്ടികളെ ഗ്രൂപ്പുകളായി തിരിച്ച് ക്വിസ് മത്സരങ്ങൾ നടത്താറുണ്ട്.	( )	( )
33	ക്ലാസ്സിലെ മത്സരങ്ങളിൽ വിജയിക്കുന്നവരെ അധ്യാപകൻ അഭിനന്ദിക്കാറുണ്ട്.	( )	( )
34	കവിത ഈണത്തിൽ പൊല്ലി പഠിപ്പിക്കുമ്പോൾ പഠിക്കാൻ കൂടുതൽ താൽപര്യം ഉണ്ടാവാറുണ്ട്.	( )	( )
35	അധ്യാപകൻ ഇടയ്ക്കിടെ പരീക്ഷ നടത്തുന്നതുകൊണ്ട് പഠിക്കാൻ ഉത്സാഹം തോന്നാറുണ്ട്.	( )	( )
36	പരീക്ഷയുടെ ഉത്തരക്കടലാസ് കിട്ടുമ്പോൾ പഠനം കൂടുതൽ മെച്ചപ്പെടുത്തണമെന്ന് തോന്നാറുണ്ട്.	( )	( )
37	അധ്യാപകൻ പാഠങ്ങൾ പഠിപ്പിക്കുമ്പോൾ ശ്രദ്ധിച്ചു കേൾക്കാറുണ്ട്.	( )	( )
38	പഠന വിഷയവുമായി ബന്ധപ്പെട്ട സ്ഥലങ്ങളിലേക്ക് വിനോദയാത്രകൾ സംഘടിപ്പിക്കാറുണ്ട്.	( )	( )
39	അധ്യാപകൻ കുട്ടികൾക്കിഷ്ടപ്പെട്ട മറ്റു കവിതകൾ പൊല്ലിത്തരാറുണ്ട്.	( )	( )
40	ക്ലാസ്സിലെ മുഴുവൻ കുട്ടികളെക്കൊണ്ടും അധ്യാപകൻ പദ്യം പൊല്ലിക്കാറുണ്ട്.	( )	( )

		ഉണ്ട് (അതെ)	ഇല്ല (അല്ല)
41	അധ്യാപകൻ കുട്ടികളെ ഗ്രൂപ്പുകളായി തിരിച്ച് പഠനപ്രവർത്തനങ്ങൾ ചെയ്യിക്കാറുണ്ട്.	( )	( )
42	ക്ലാസ്സിലെ എല്ലാ കുട്ടികളേയും പങ്കെടുപ്പിച്ചു കൊണ്ട് സാഹിത്യസമാജങ്ങൾ നടത്താറുണ്ട്.	( )	( )
43	പഠന കാര്യങ്ങൾ ആദ്യം തനിക്ക് തന്നെ ചെയ്തു തീർക്കണമെന്ന വാശി ക്ലാസ്സിലെ ഓരോ കുട്ടിക്കും ഉണ്ട്.	( )	( )
44	കഴിഞ്ഞ പരീക്ഷയേക്കാൾ കൂടുതൽ മാർക്ക് വാങ്ങാൻ ഞാൻ ഓരോ തവണയും ശ്രമിക്കാറുണ്ട്.	( )	( )
45	ക്ലാസ്സിൽ ഒന്നാംസ്ഥാനം വരിക്കണമെന്ന ആഗ്രഹത്തോടെ ഞാൻ പഠിക്കാറുണ്ട്.	( )	( )
46	ക്ലാസ്സിലെ ഓരോ കുട്ടിക്കും അവരുടെ പഠനപ്രവർത്തനങ്ങൾ കൂട്ടുകാരുടേതിനേക്കാൾ മെച്ചമായിരിക്കണമെന്ന് നിർബന്ധമുണ്ട്.	( )	( )
47	കഴിഞ്ഞ പരീക്ഷയേക്കാൾ കൂടുതൽ മാർക്ക് ഇപ്പോഴത്തെ പരീക്ഷയിൽ നേടുന്ന കുട്ടികളെ അധ്യാപകൻ പ്രത്യേകം അഭിനന്ദിക്കാറുണ്ട്.	( )	( )
48	വിജയം എനിക്കു തന്നെയാണെന്ന് ഉറപ്പുള്ള കാര്യങ്ങൾ ചെയ്യുവാൻ എനിക്ക് ഉത്സാഹം തോന്നാറുണ്ട്.	( )	( )
49	മത്സരങ്ങളിൽ മറ്റുള്ളവരേക്കാൾ മുൻപന്തിയിലെത്താൻ ഞാൻ കഠിനമായി പ്രയത്നിക്കാറുണ്ട്	( )	( )
50	അധ്യാപകരുടെ സഹായം കൂടാതെ തന്നെ പഠനപ്രവർത്തനങ്ങൾ ചെയ്തു തീർക്കണമെന്ന് മിക്ക കുട്ടികളും നിർബന്ധമുള്ളവരാണ്.	( )	( )

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Appendix V

UNIVERSITY OF CALICUT
DEPARTMENT OF EDUCATION

CLASSROOM ENVIRONMENT INVENTORY
(PRIMARY LEVEL)

Dr. Kamala S. Pillai and Sunitha P.P.

Name _____ Class _____ Class Number _____
School _____ Boy/Girl _____

Instructions: The following statements are related to the study in the class. Space is provided to answer Yes/No corresponding to each statement. Tick marks (✓) should be put in their proper places with in the brackets.

		Yes	No
1.	All the pupils in my class are my friends	( )	( )
2.	All the pupils in my class together have selected a class leader	( )	( )
3.	The pupils in my class help each other	( )	( )
4.	I am friendly with other pupils in the class	( )	( )
5.	I help other pupils in the class whenever they are in need	( )	( )
6.	Our class leader gives us appropriate directions in study matters	( )	( )
7.	My friends help me in study matters	( )	( )

		Yes	No
8.	Pupils who are good in studies of my class are appreciated in the class	( )	( )
9.	I accept the advice given by my friends	( )	( )
10.	Pupils who are weak in their studies are helped by outstanding pupils in my class	( )	( )
11.	Some pupils in my class always quarrel	( )	( )
12.	I get angry when my friends comment on me	( )	( )
13.	I am not on talking terms with some of the pupils in my class	( )	( )
14.	I feel unhappy when my friends get more marks than I get	( )	( )
15.	Even my close friends in my class quarrel with me	( )	( )
16.	Pupils in my class cannot get together in study matters	( )	( )
17.	I don't lend my book, pen and the like to other pupils in the class	( )	( )
18.	We get punishment from our teacher when we come to the class without doing the home work	( )	( )
19.	Pupils in my class quarrel with the class leader	( )	( )
20.	When the teacher scolds, we will be unhappy	( )	( )
21.	Noise from outside the classroom disturb the studies	( )	( )
22.	When the teacher gives too much homework on a subject I feel hatred towards the subject	( )	( )

		Yes	No
23	The majority of pupils in my class have difficulty in learning activities	( )	( )
24.	Certain class subjects are very difficult to study	( )	( )
25.	Since lessons written on the blackboard are not visible, it is difficult to study	( )	( )
26.	I skip lessons which are difficult to study	( )	( )
27.	I have difficulty in understanding the lessons when the teacher gives the lessons speedily	( )	( )
28.	The teacher suggests easy ways to learn difficult lessons whenever needed	( )	( )
29.	I spend more time to study difficult lessons	( )	( )
30.	The teacher helps pupils who are weak in their studies	( )	( )
31.	All pupils in my class are interested in studies	( )	( )
32.	Quiz competitions are conducted by groups formed in the class	( )	( )
33.	Teacher appreciates those who win competitions	( )	( )
34.	When poems are recited rhythmically, pupils show more interest in studying poems	( )	( )
35.	When the teacher conducts class tests periodically, we are more motivated to learn	( )	( )
36.	I feel the necessity to improve my studies when I get back my answer sheets after valuation	( )	( )

		Yes	No
37.	I listen carefully when the teacher gives lessons in the class	( )	( )
38.	Field trips are organised to places related to our study	( )	( )
39.	Teacher recites poems other than those prescribed for studies	( )	( )
40.	Teacher allows all pupils in the class to recite poems	( )	( )
41.	Teacher gets classroom tasks done by pupils in small groups	( )	( )
42.	Literary activities are organisd with participation of all pupils in the class	( )	( )
43.	Each pupil has keen desire to complete the learning task at first	( )	( )
44.	I study hard and try to get more marks than in the previous class test	( )	( )
45.	I study with the intention of securing first division in the class	( )	( )
46.	Each pupil has a desire to excel others in the class in studies	( )	( )
47.	Teacher praises those who score more marks than in the previous exam	( )	( )
48.	I feel enthusiastic to do the tasks which bring success to me	( )	( )
49.	I work hard to excel others in competitions	( )	( )
50.	Some pupils are particular to study on their own, without seeking the help of the teachers	( )	( )

Appendix VI

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

VERBAL GROUP TEST OF INTELLIGENCE

Dr. P.K. Sudheesh Kumar

Hameed. A. & Prasanna. A.

വിദ്യാർത്ഥികളുടെ മാനസികമായ കഴിവുകൾ പരിശോധിക്കുന്നതിനുവേണ്ടി തയ്യാറാക്കിയിട്ടുള്ളതാണ് ഈ ടെസ്റ്റ്. വിവിധ തരത്തിലുള്ള 5 ടെസ്റ്റുകൾ ഇതിൽ ഉൾക്കൊള്ളിച്ചിരിക്കുന്നു. ഓരോ ടെസ്റ്റിന്റെയും ആരംഭത്തിൽ കൊടുത്തിട്ടുള്ള നിർദ്ദേശങ്ങൾ എഴുതിത്തുടങ്ങുന്നതിനുമുമ്പ് ശ്രദ്ധിച്ചു വായിക്കുക. ഉത്തരം എഴുതേണ്ട രീതി ഉദാഹരണസഹിതം വ്യക്തമാക്കിയിട്ടുണ്ട്. നിർദ്ദിഷ്ട സമയത്തിനുള്ളിൽ ഉത്തരം എഴുതിത്തീർക്കാൻ ശ്രദ്ധിക്കുകയും, പറഞ്ഞതിനുശേഷം മാത്രം എഴുതിത്തുടങ്ങുകയും, ഏറ്റവും വേഗത്തിൽ എഴുതിത്തീർക്കാൻ ശ്രമിക്കുകയും ചെയ്യേണ്ടതാണ്. തന്നിരിക്കുന്ന ഈ ചോദ്യക്കടലാസിൽ എന്തെങ്കിലും എഴുതുകയോ, അടയാളപ്പെടുത്തുകയോ ചെയ്യരുത്. പ്രത്യേകം തന്നിട്ടുള്ള ഉത്തരക്കടലാസിൽ മാത്രമേ ഉത്തരം എഴുതാവൂ.

TEST - I VERBAL ANALOGY

ഈ വിഭാഗത്തിൽ കൊടുത്തിട്ടുള്ള ചോദ്യങ്ങളിൽ മൂന്നു വാക്കുകൾ വീതം തന്നിട്ടുണ്ട്. നാലാമത്തെ വാക്ക് നിങ്ങൾ എഴുതേണ്ടതാണ്. തന്നിരിക്കുന്ന മൂന്നുവാക്കുകളിൽ ആദ്യത്തെ രണ്ടു വാക്കുകൾ തമ്മിലുള്ള ബന്ധം മനസ്സിലാക്കി മൂന്നാമത്തെ വാക്കിനോട് യോജിക്കുന്ന വാക്ക് A, B, C, D എന്നീ ക്രമത്തിൽ കൊടുത്തിരിക്കുന്ന നാലുവാക്കുകളിൽ നിന്നും തെരഞ്ഞെടുത്ത് ഉത്തരക്കടലാസ്സിൽ അടയാളപ്പെടുത്തുക.

ഉദാഹരണം :

ദാഹം : വെള്ളം : : വിശപ്പ് : ....

A. മാംസം, B. വിശ്രമം, C. ആഹാരം, D. ക്ഷീണം

ദാഹം വരുമ്പോൾ വെള്ളം കുടിയ്ക്കുന്നു. അതുപോലെ വിശപ്പുവരുമ്പോൾ ആഹാരം കഴിക്കുന്നു. അത്കൊണ്ട് 'C' യാണ് ശരിയായ ഉത്തരം.

A	B	C √	D

1. കൗശലം : കുറുക്കൻ : : വിസ്തൃതം : ... ...
   A. കുരങ്ങൻ B. കരടി C. മാൻ D. കഴുത

2. ദയ : ക്രൂരത : : നിശബ്ദത : ... ...
   A. നിശ്ചലം B. ശബ്ദം C. ശാന്തത D. ധ്യാനം

3. നാടകം : സംവിധായകൻ : : ന്യൂസ്പേപ്പർ : ... ...
   A. മാനേജർ B പത്രാധിപർ C. ഉടമസ്ഥൻ D. പ്രസ്സ്

4. കപ്പൽ : ക്യാപ്റ്റൻ : : വിമാനം : ... ...
   A. കടൽ B. എയർപോർട്ട് C. ഡ്രൈവർ D. പൈലറ്റ്

5. കരച്ചിൽ : ചിരി : വിഷമം : ... ...
   A. സന്തോഷം B. ഉന്മേഷം C. ശാന്തി D. സമാധാനം

6. ഷർട്ട് : തുണി : : ചെരുപ്പ് : ... ...
   A. ഉളി B. തുകൽ C. ചെരുപ്പുകുത്തി D. തയ്യൽക്കാരൻ

7. കാക്ക : കറുപ്പ് : : ഹംസം : ... ...
   A പക്ഷി B. വെള്ളം C. വെളുപ്പ് D. തവിട്ട്

8. മാസിക : വായനക്കാരൻ : : റേഡിയോ : ... ...
   A. പരസ്യക്കാർ B. അറിയിപ്പുകാർ C. കാഴ്ചക്കാർ D. കേൾവിക്കാർ

9. വീറക് : കോടാലി : : തുണി : ... ...
   A. മെഷീൻ B. സൂചി C. കത്രിക D. നൂല്

10. വിദ്യാർത്ഥി : ക്ലാസ്സ്റൂം : : കളിക്കാരൻ : ... ...
A. സ്റേഡിയം B. മത്സരം C. കോച്ച് D. കളി

11. വീട് : മേൽക്കൂര : : ഭൂമി : ... ...
A. വായു B. ആകാശം C. അന്തരീക്ഷം D. ധ്രുവങ്ങൾ

12. കുട്ടി : മാതാപിതാക്കൾ : : ബുക്ക് ... ...
A. അധ്യാപകൻ B പ്രസാധകൻ C. പ്രസ്സ് D. ഗ്രന്ഥകർത്താവ്

13. വർഷം : മാസം : : ആഴ്ച : ... ...
A. മണിക്കൂർ B. മിനിറ്റ് C. രണ്ടാഴ്ച D. ദിവസം

14. രാത്രി : പകൽ : : ദ്വേഷ്യം : ... ...
A. സഹായം B. ദയ C. ഇഷ്ടം D. സന്തോഷം

15. കവി : കവിത : : സംഗീതം : ... ...
A. രചയിതാവ് B. എഴുത്തുകാരൻ C. നിർമ്മാതാവ് D. കണ്ടക്ടർ

16. മഞ്ഞ് : വെളുപ്പ് : : കൽക്കരി : ... ...
A. പുക B. ചുവപ്പ് C. കറുപ്പ് D. മഞ്ഞ

17. പശു : മൃഗം : : കോഴി : ... ...
A. വീട് B. പക്ഷി C. മുട്ട D. കൂട്

18 നീന്തൽ : വെള്ളം : : സ്കേറ്റിംഗ് : ... ...
A. മഞ്ഞ് B. ആകാശം C. പർവ്വതം D. ശൂന്യാകാശം

19. മനുഷ്യൻ : ആത്മകഥ : : രാഷ്ട്രം : ... ...
A. ജനങ്ങൾ B. ജനസംഖ്യ C. ഭൂമിശാസ്ത്രം D. ചരിത്രം

20. മരുന്ന് : രോഗം : : പുസ്തകം : ... ...
A. അറിവ് B. അധ്യാപകൻ C. ഗ്രന്ഥകാരൻ D. രചയിതാവ്

TEST II VERBAL CLASSIFICATION

ഈ വിഭാഗത്തിലുള്ള ചോദ്യങ്ങളിൽ ഓരോന്നിലും A, B, C, D എന്നിങ്ങനെ നാലുവാക്കുകൾ വീതം തന്നിട്ടുണ്ട്. അതിൽ ഒരെണ്ണം മറ്റു മൂന്നു വാക്കുകളോടും യോജിക്കാതെ നിൽക്കുന്നു. അത് ഏതെന്ന് കണ്ടുപിടിച്ച് ഉത്തരക്കടലാസിൽ അടയാളപ്പെടുത്തുക:

ഉദാഹരണം :

1. A. മധുരം B. മുളക് C എരിവ് D. കയ്പ്

ഇതിൽ A, C, D എന്നിവ വിവിധ രുചികളെകാണിക്കുന്നു. B (മുളക്) രുചികളിൽ ഉൾപ്പെടുന്നതല്ല. അതുകൊണ്ട് ശരി ഉത്തരം 'B' ആണ്.

A	B √	C	D

1.	A. അധ്യാപകൻ	B. പ്രിൻസിപ്പാൾ	C. വിദ്യാർത്ഥി	D. പ്രൊഫസർ
2.	A. ബസ്സ്	B. വിമാനം	C. സൈക്കിൾ	D. ലോറി
3.	A. നടക്കുക	B. ചിന്തിക്കുക	C. നിന്തുക	D. ചാടുക
4.	A. വൃത്തം	B. ചതുരം	C. ത്രികോണം	D. ഷഡ്ഭുജം
5.	A. സൗന്ദര്യം	B. വാർദ്ധക്യം	C. മിടുക്കൻ	D. യൗവ്വനം
6.	A. ഗ്രാം	B. കിലോഗ്രാം	C. മീറ്റർ	D. ക്വിൻറൽ
7.	A. സമാധാനം	B. ശബ്ദം	C. ധ്യാനം	D. നിശ്ചലം
8.	A. സംവിധായകൻ	B. നടൻ	C. പാട്ടുകാരൻ	D. പ്രാസംഗികൻ
9.	A. ദിവസം	B. കലണ്ടർ	C. മാസം	D. ആഴ്ച
10.	A. ക്വിൻറൽ	B. ഇഞ്ച്	C. മൈൽ	D. വാര
11.	A നാവ്	B. കണ്ണ്	C. പല്ല്	D. മൂക്ക്
12.	A ഗോതമ്പ്	B റാഗി	C. നെല്ല്	D. പയറ്
13.	A. പാമ്പ്	B. തിമിംഗലം	C. അരണ	D. ആമ
14.	A. പെൻസിൽ	B. കട	C. പെയിൻറ്	D. ക്യാൻവാസ്
15.	A. മാവ്	B. പ്ലാവ്	C. തെങ്ങ്	D. തെക്ക്
16.	A. മാങ്ങ	B. ആപ്പിൾ	C തക്കാളി	D. ഉരുളക്കിഴങ്ങ്
17.	A. ചെവി	B. വിരൽ	C. കൈ	D. കാൽ
18.	A. കോഴി	B. ആട്	C. പശു	D. കാള
19.	A. ഓഫീസ്	B. വീട്	C. സംഘാവ്	D. കൂടിൽ
20.	A. അറിയിപ്പുകാർ	B. കാഴ്ചക്കാർ	C. രചയിതാവ്	D. കേൾവിക്കാർ

TEST III NUMERICAL REASONING

താഴെകൊടുത്തിരിക്കുന്ന 6, ചോദ്യങ്ങളിൽ കുറെ സംഖ്യകൾ ഓരോ ക്രമത്തിൽ കൊടുത്തിരിക്കുന്നു. ഒന്ന് എഴുതാതെയും വിട്ടിരിക്കുന്നു. താഴെ A, B, C, D എന്നീ ക്രമത്തിൽ നാല് ഉത്തരങ്ങൾ കൊടുത്തിരിക്കുന്നു. ഇവയിൽനിന്നും ശരിയുത്തരം കണ്ടെത്തി അടയാളപ്പെടുത്തുക.

ഉദാഹരണം :

1. 2, 4, 6, ——, 10
   A. 5 B. 8 C. 7 D. 11

A	B√	C	D

1. 4, 9, 16, 25, 36————
   A. 39 B. 47 C. 49 D. 59

2. 25, 24, 22, 19, ——, 10
   A. 15 B. 16 C. 17 D. 14

3. 6, 8, ——, 20, 35
   A. 15 B. 14 C. 16 D 12

4. 2, 6, 12, 20, 30, ——
   A. 42 B. 46 C. 40 D 36

5. 3, 3, 6, 18, ——
   A. 68 B. 33 C. 72 D. 29

6. 2, 4, 6, ——, 10
   A. 7 B. 5 C 8. D. 9

7 മുതൽ 10 വരെയുള്ള ചോദ്യങ്ങളിൽ ഓരോന്നിലും A, B, C, D എന്നിങ്ങനെ നാലു സംഖ്യകൾ തന്നിട്ടുണ്ട്. അതിൽ ഒരു സംഖ്യ മറ്റു മൂന്നു സംഖ്യകളോടും യോജിക്കാതെ നിൽക്കുന്നു. അത് ഏതെന്ന് കണ്ടുപിടിച്ച് ഉത്തരക്കടലാസ്സിൽ അടയാളപ്പെടുത്തുക.

ഉദാഹരണം :

A. 1 B. 3 C. 6 D. 7

ഇതിൽ A, B, D എന്നിവ ഒറ്റ സംഖ്യകളെ സൂചിപ്പിക്കുന്നു. എന്നാൽ 'C' ഒറ്റസംഖ്യയല്ല അതുകൊണ്ട് ഉത്തരം 'C'യാകുന്നു.

A	B	C√	D

7. A. 1 B. 5 C. 25 D. 75
8. A. 3 B. 4 C. 7 D. 9
9. A. 12 B. 24 C. 35 D. 48
10. A. 150 B. 36 C 12 D. 4

11 മുതൽ 20 വരെയുള്ള ചോദ്യങ്ങളിൽ മൂന്നു സംഖ്യകൾ വീതം തന്നിട്ടുണ്ട്. നാലാമത്തെ സംഖ്യ നിങ്ങൾ എഴുതേണ്ടതാണ്. തന്നിരിക്കുന്ന മൂന്നുസംഖ്യകളിൽ ആദ്യത്തെ രണ്ടു സംഖ്യകൾ തമ്മിലുള്ള ബന്ധം മനസ്സിലാക്കി മൂന്നാമത്തെ സംഖ്യയോട് യോജിക്കുന്ന സംഖ്യ A. B. C. D. എന്നീ ക്രമത്തിൽ കൊടുത്തിരിക്കുന്ന സംഖ്യകളിൽനിന്നും തെരഞ്ഞെടുത്ത് ഉത്തര കടലാസിൽ അടയാളപ്പെടുത്തുക.

ഉദാഹരണം:

1. 1 : 2 :: 2 :———

A. 6 B. 4 C. 1 D. 5

ഒന്നിന്റെ ഇരട്ടിയാണ് രണ്ട്. അതുപോലെ രണ്ടിന്റെ ഇരട്ടിയാണ് നാല് അത്കൊണ്ട് ഉത്തരം 'B' ആണ്.

A	B√	C	D

11. 3 : 5 :: 11 : ———
A. 12 B. 13 C. 14 D. 15

12. 5 : 25 :: 3 : ———
A. 6 B. 12 C. 15 D. 9

13. 1 : 6 :: 7 : ———
A. 12 B. 13 C. 11 D. 14

14 10 : 20 :: 18: ———
A. 26 B. 36 C. 46 D. 32

15 4 : 5 :: 8 : ———
A. 6 B. 7 C. 5 D. 9

16. 12 : 72 :: 6: ———
A. 58 B. 38 C. 46 D. 52

17. 12:4 :: 24 :———
A 6 B. 10 C 8 D. 12

18 28 : 22 :: 46: ———
A. 40 B. 38 C. 42 D. 29

19 49 : 7 :: 4: ———
A. 16 B. 8 C. 2 D. 12

20. 48; 8 :: 18: ———
A. 8 B. 4 C. 2 D. 3

TEST IV VERBAL REASONING

ഈ വിഭാഗത്തിലുള്ള ഓരോ ചോദ്യങ്ങൾക്കും A, B, C, D എന്ന ക്രമത്തിൽ നാലു വീതം ഉത്തരങ്ങൾ കൊടുത്തിട്ടുണ്ട്. ചോദ്യം ശരിയായി വായിച്ച് മനസ്സിലാക്കി ശരിയായ ഉത്തരം ഉത്തരക്കടലാസിൽ അടയാളപ്പെടുത്തുക.

ഉദാഹരണം :

1. ബിന്ദുവിന് സിന്ധുവിനേക്കാൾ വണ്ണം കൂടുതലാണ്. മഞ്ജുവിനു ബിന്ദുവിനേക്കാൾ വണ്ണം കുറവാണ്. മഞ്ജുവിനും സന്ധ്യയ്ക്കും തുല്യ വണ്ണമാണുള്ളത്. എന്നാൽ ഇവരിലാർക്കാണ് ഏറ്റവും വണ്ണം കൂടുതൽ ?

   A. മഞ്ജു B. ബിന്ദു C. സിന്ധു D. സന്ധ്യ

   ബിന്ദുവിനാണല്ലോ മറ്റെല്ലാവരെക്കാളും വണ്ണം കൂടുതൽ അതുകൊണ്ട് ഉത്തരം 'B' എന്ന് അടയാളപ്പെടുത്തുക.

A	B√	C	D

1. അപ്പു ചിപ്പുവിനേക്കാൾ നന്നായി പാടും. ദേവന് കണ്ണനോളം പാടാൻ കഴിയില്ല. കണ്ണന് അപ്പുവിനേക്കാൾ പാടാൻ കഴിയും. എന്നാൽ ഇവരിൽ ആരാണ് നന്നായി പാടുന്നത് ?

   A. അപ്പു B. കണ്ണൻ C. ചിപ്പു D. ദേവൻ

2. രാമൻ രമയേക്കാൾ പിന്നിലാണ് നടക്കുന്നത്. രമണി രമയേക്കാൾ പിന്നിലും രാമനേക്കാൾ മുന്നിലുമാണ് നടക്കുന്നത്. രാജു രമണിയേക്കാൾ മുൻപിലാണ് നടന്നുന്നത് എങ്കിൽ ഏറ്റവും പുറകിൽ നടക്കുന്നതാര് ?

   A. രാമൻ B. രമണി C. രമ D. രാജു

3. അജയ് വിജയ്നേക്കാൾ ജോലി ചെയ്യും. അശോകും അജിത്തും ജോലിചെയ്യുന്നതിൽ തുല്യരാണ്. വിജയ് അശോകിനേക്കാൾ നന്നായി ജോലി ചെയ്യും. ഇവരിൽ ഏറ്റവും കൂടുതൽ ജോലി ചെയ്യുന്നതാര് ?

   A. അശോക് B. അജിത്ത് C. വിജയ് D. അജയ്

4. രമ്യ ദിവ്യയോളം നൃത്തം ചെയ്യില്ല. ദിവ്യ ധന്യയേക്കാൾ നന്നായി നൃത്തം ചെയ്യും. വിദ്യ ദിവ്യയേക്കാൾ നൃത്തത്തിൽ മിടുക്കിയാണ് എങ്കിൽ ഇവരിലാരാണ് നൃത്തത്തിൽ മിടുമിടുക്കി ?

   A. ദിവ്യ B. ധന്യ C. രമ്യ D. വിദ്യ

5. ദീപകിന്റെ അച്ഛനാണ് മോഹനന്റെ മകൻ എങ്കിൽ ദീപകും മോഹനനും തമ്മിലുള്ള ബന്ധമെന്ത് ?

   A. മകൻ B. സഹോദരൻ C. അനന്തരവൻ D. കൊച്ചുമകൻ

6. റഫീക്കിന് മുനീറിനേക്കാൾ കാഴ്ചയുണ്ട്. ഷമീറിന് സുധീറിനേക്കാൾ കാഴ്ചകുറവാണ്. സുധീറിന് റഫീക്കിനോളം കാഴ്ചശക്തിയില്ല. ഇവരിൽ ആർക്കാണ് കാഴ്ച ഏറ്റവും കൂടുതൽ ?

   A. സുധീറിന് B. ഷമീറിന് C. റഫീക്കിന് D. മുനീറിന്

7. രണ്ടുപേർ ചേർന്ന് പത്ത് ദിവസം കൊണ്ട് ഒരു ജോലിചെയ്തുതീർത്തു എങ്കിൽ ഒരാൾക്ക് ഒരു ദിവസം കൊണ്ട് എത്ര ജോലിചെയ്യാൻ കഴിയും ?

   A. $\frac{1}{2}$ B. $\frac{1}{5}$ C. $\frac{1}{10}$ D. $\frac{1}{20}$

8. ഒരു വെടിയൊച്ച A എന്ന സ്ഥലത്തുനിന്നും B എന്ന സ്ഥലത്തെത്താൻ എടുക്കുന്ന സമയം 2 മിനിറ്റ്. എന്നാൽ 5 വെടിയൊച്ചകൾ A എന്ന സ്ഥലത്തുനിന്നും B എന്ന സ്ഥലത്തെത്താൻ എത്ര സമയമെടുക്കും ? .

   A. 10 മി. B. 2 മി C. 4 മി D. 5 മി.

9. ഷർമിളയ്ക്ക് മാലയേക്കാൾ പ്രായം കുറവാണ്. കുഞ്ചനും നന്ദുവും തുല്യ പ്രായമാണുള്ളത്. സുധീഷിന് നന്ദുവേക്കാൾ പ്രായം കുറവാണ്. സുധീഷിന് ഷർമിളയേക്കാൾ പ്രായം കൂടുതലാണ്. മാലയ്ക്ക് സുധീഷിനോളം പ്രായം ഇല്ല. എന്നാൽ ഏറ്റവും കൂടുതൽ പ്രായമാർക്ക്?

   A. സുധീഷ് B. മാല C. ഷർമിള D. കുഞ്ചൻ

10. ഒരു സ്കൂളിലെ ഫീസടയ്ക്കാൻ നിൽക്കുന്ന 'ക്യൂ'വിലെ കുട്ടികളുടെ എണ്ണം 70 ആകുന്നു. അതിൽ മോഹനന്റെ സ്ഥലം ജനലിന്റെ അടുത്തുനിന്നും 54-മത്തേതാണെങ്കിൽ അവന്റെ പുറകിൽ എത്ര പേരുണ്ടാകും ?

    A. 15 B. 16 C. 17 D. 18

11. തെക്കേ പടിഞ്ഞാറ് വടക്കാണെങ്കിൽ വടക്കുകിഴക്ക് എന്തായിരിക്കും ?

A. പടിഞ്ഞാറ് B. തെക്കുപടിഞ്ഞാറ് C. കിഴക്കുപടിഞ്ഞാറ് D. തെക്ക്

12. A, Bയുടെ മകനാണ്. Bയും Cയും സഹോദരികളാണ്. D, Cയുടെ അമ്മയും E. Dയുടെ മകനുമാണ് എന്നാൽ താഴെ പറയുന്നവയിൽ ഏതാണ് ശരി ?

A. Aയുടെ അമ്മയുടെ സഹോദരിയാണ് E.

B. Cയും Eയും സഹോദരിസഹോദരൻമാരാണ്.

C. C, Aയുടെ അമ്മൂമ്മയാണ്.

D. Aയും Eയും സഹോദരൻമാരാണ്.

13 ഒരു കമ്പനിയിലെ തൊഴിലാളികളുടെ എണ്ണം 60 ആകുന്നു. അതിൽ $\frac{1}{4}$ പേർക്ക് കാറും $\frac{1}{2}$ പേർക്ക് സ്കൂട്ടറും, $\frac{1}{5}$ പേർക്ക് കാറും സ്കൂട്ടറുമുണ്ട്. എന്നാൽ എത്രപേർക്കാണ് കാറോ, സ്കൂട്ടറോ ഇല്ലാത്തത് ?

A 12 B 32 C 30 D. 28

14. 51 പേരുള്ള ഒരു ക്ലാസ്സിൽ അഖിലിനു 21-ാമതായാണ് റാങ്ക്. ഏറ്റവും ഒടുവിലത്തെ രാങ്കുള്ള കുട്ടിയിൽ നിന്നും കണക്കാക്കുമ്പോൾ അഖിലിനു ലഭിക്കുന്ന റാങ്കായിരിക്കും ഉണ്ടാവുക ?

A. 12 B. 30 C. 31 D. 35

15. ഓഫീസ് 'X' എന്ന സ്ഥലത്തുനിന്നും 4 മൈൽ കിഴക്കോട്ടു നടന്ന് ഇടത്തോട്ട് തിരിഞ്ഞ് വീണ്ടും 5 മൈൽ നടന്ന് വീണ്ടും ഇടത്തോട്ട് തിരിഞ്ഞ് 3 മൈൽ നടന്നു. എങ്കിൽ അയാൾ ഇപ്പോൾ നടക്കുന്ന ദിശയേത് ?

A. വടക്ക് B. പടിഞ്ഞാറ് C. കിഴക്ക് D. തെക്ക്

16. F, Aയുടെ സഹോദരനാണ്. C, Aയുടെ മകളാണ്. K, Fന്റെ സഹോദരിയാണ്. G, Cയുടെ സഹോദരനാണ്. ഇതിൽ ആരാണ് Gയുടെ അമ്മാവൻ ?

A. F B C C. K D. A

17. മിനുവിനേക്കാൾ രണ്ടുവയസ്സുള്ള ജിനുവിന് മിനുവിനേക്കാൾ മൂന്നുമടങ്ങ് പ്രായമുണ്ട്. മൂന്നുപേരുടേയും വയസ്സു കൂട്ടിയാൽ 19 കിട്ടും എങ്കിൽ മിനുവിന്റെ വയസ്സ് എത്ര ?

A. 5 B. 3 C 9 D. 10

18. ഒരു മാവേലിസ്റ്റോറിന്റെ മുന്നിലുള്ള ക്യൂവിൽ നിൽക്കുന്ന X എന്നയാളിന്റെ സ്ഥാനം മുന്നിൽനിന്നും 22 മത്തേതും പിന്നിൽ നിന്നും 28 മത്തേതുമാണെങ്കിൽ ആകെ ക്യൂവിലുള്ള ആളുകളുടെ എണ്ണം എത്ര ?

A. 49 B. 52 C. 50 D 54

19. Aയ്ക്ക് Yയേക്കാൾ നീളം കൂടുതലാണ് Bയ്ക്ക് Xനേക്കാൾ നീളം കുറവാണ്. Xനും Yയ്ക്കും തുല്യ നീളമാണുള്ളത് Zന് Aയേക്കാൾ നീളം കൂടുതലുണ്ട് എങ്കിൽ ഏറ്റവും നീളം കുറവാർക്ക് ?

A. X B Y C. A D. B

20 ശ്യാമിന്റെ അച്ഛനാണ് സഞ്ജയിന്റെ മകനെങ്കിൽ ശ്യാമും, സഞ്ജയും തമ്മിലുള്ള ബന്ധം എന്ത് ?

A. മകൻ B കൊച്ചുമകൻ C. സഹോദരൻ D. ഭരനന്തരവൻ

TEST V COMPREHENSION

ഈ വിഭാഗത്തിലുള്ള ചോദ്യങ്ങളിൽ ഓരോന്നിലും ഏതാനും ചില പ്രസ്താവനകൾ കൊടുത്തിട്ടുണ്ട്. ഇവ ശ്രദ്ധാപൂർവ്വം വായിച്ച് അതിനുതാഴെ കൊടുത്തിരിക്കുന്ന ചോദ്യങ്ങൾക്ക് ഉത്തരം കണ്ടെത്തുക. A, B, C, D എന്നീ ക്രമത്തിൽ നാല് ഉത്തരങ്ങൾ കൊടുത്തിരിക്കുന്നു. ശരി ഉത്തരം കണ്ടെത്തി ഉത്തരക്കടലാസിൽ അടയാളപ്പെടുത്തുക.

ഉദാഹരണം :

സതീഷിന്റെ പുത്രന്മാരാണ് Aയും Bയും, പുത്രിമാരാണ് Cയും, Dയും. ശ്യാമയുടെ മക്കളാണ് Xഉം Yയും മനോജിന്റെ മക്കളായ Eയും Fഉം ഒരു കമ്പനിയിൽ ജോലിയുള്ളവരാണ്. Aയും Dയും വിവാഹിതരാണ്. X, വിവാഹം ചെയ്തിരിക്കുന്നത് Cയെയും F, വിവാഹം ചെയ്തിരിക്കുന്നത് Aയെയും ആണ്. മനോജിനും ശ്യാമയ്ക്കും തമ്മിൽ സഹോദരിസഹോദര ബന്ധമാണ്.

ചോദ്യങ്ങൾ;

1. X-ഉം E-യും തമ്മിലുള്ള ബന്ധമെന്ത് ?

   A. മകനും അച്ഛനും. B. സഹോദരിസഹോദരന്മാർ

   C. സഹോദരിസഹോദരന്മാരുടെ മക്കൾ D. മകളും അച്ഛനും.

A	B	√C	D

(1) ഒരു വിദ്യാലയത്തിലെ നാല് അംഗങ്ങളാണ് W, X, Y, Z. ഇവരിൽ W, X, Y വിദ്യാഭ്യാസമുള്ളവരാണ് W, Y, Z സത്യസന്ധരും Y, Z എന്നിവർ ജോലിയുള്ളവരുമാകുന്നു. W, X, Z എന്നിവർക്ക് വിനയവുമുണ്ട്.

1. ആരാണ് വിദ്യാഭ്യാസം, സത്യസന്ധത എന്നീ ഗുണങ്ങളുള്ളതും എന്നാൽ ജോലിയില്ലാത്തതും?

   A. W B. X C. Y D. Z

2. ജോലിയും, വിദ്യാഭ്യാസവും, സത്യസന്ധതയും ഉള്ളതാർക്കാണ് ?

   A. W B. X C. Y D. Z

3. ആർക്കാണ് ജോലിയും സത്യസന്ധയുമുള്ളതും എന്നാൽ വിദ്യാഭ്യാസമില്ലാത്തതും ?

   A. W B. X C. Y D. Z

4. വിദ്യാഭ്യാസവും വിനയവും ഉണ്ടെങ്കിലും സത്യസന്ധതയും ജോലിയും ഇല്ലാത്തതാർക്ക് ?

   A. W B. X C. Y D. Z

5. സത്യസന്ധതയും, ജോലിയും, വിനയവും ഉണ്ടായിട്ടും വിദ്യാഭ്യാസമില്ലാത്തതാർക്കാണ്?

   A. W B. X C. Y D. Z

(2) ദിനേശിന് Aഎന്ന പുത്രിയും B, C എന്ന പുത്രന്മാരുമുണ്ട്. ശ്യാമിന് P, Q എന്ന പുത്രന്മാരും R എന്ന പുത്രിയുമുണ്ട്. Pയും Cയും വിവാഹിതരാണ്, M-ഉം, N-ഉം അവരുടെ പുത്രന്മാരും. രോഹിത്തിന്റെ പുത്രൻ S, പുത്രി Tയുമാണ്. T വിവാഹം കഴിച്ചിരിക്കുന്നത് Bയെ, അവരുടെ പുത്രിമാരാണ് Dയും Eയും പുത്രൻ G.

6. Qവിന് Nമായുള്ള ബന്ധമെന്ത് ?

   A. അച്ഛൻ B. മുത്തച്ഛൻ C. അമ്മാവൻ D. പുത്രൻ

7. ദിനേശിന് Eയുമായുള്ള ബന്ധമെന്ത് ?

   A. മുത്തച്ഛൻ B. അമ്മാവൻ C. അച്ഛൻ D. പുത്രൻ

8. Mന് R-നോടുള്ള ബന്ധമെന്ത് ?

   A. അമ്മ B മകൾ C. അനന്തിരവൾ D. അമ്മായി

9. Bയ്ക്ക് Gയോടുള്ള ബന്ധമെന്ത് ?

   A. മകൻ B. അമ്മ C. അമ്മായി D. അനന്തിരവൾ

10 Eസ്സിന് S-നോടുള്ള ബന്ധമെന്ത് ?

   A. രക്ഷകർത്താവ് B. അമ്മാവൻ C. സഹോദരിപുത്രി D. അച്ഛൻ

(4) 5 PQ 8 = 5^2+8 = 25+8=33 ആയാൽ

11. 4 PQ 4 = ?

A. 16 B. 20 C. 24 D. 12

12. 4 PQ 1 = ?

A. 17 B 12 C 8 D. 9

13. 5 PQ 5 = ?

A. 20 B. 30 C. 15 D. 25

14. 6 PQ ? = 108

A. 72 B. 82 C. 52 D. 42

15. ? PQ 9 = 109

A. 50 B. 25 C 20 D. 10

(5) ഒരു വീട്ടിലെ ആറ് അംഗങ്ങളാണ് U, V, W, X, Y, Z ഇവരിൽ ഒരാൾ ഫുഡ്ബോൾ കളിക്കാരനും, മറ്റൊരാൾ ചെസ്സ് കളിക്കാരനും, ഇനിയുമൊരാൾ ക്രിക്കറ്റുകളിക്കാരനുമാണ്. സഹോദരിമാരായ U ഉം X ഉം ഒരു കളിയിലും പങ്കെടുക്കുന്നില്ല. ഒറ്റ സ്ത്രീകളും ഫുഡ്ബോൾ കളിയിലോ ക്രിക്കറ്റ് കളിയിലോ ഏർപ്പെടുന്നില്ല. ഇവരിൽ ഒരു വിവാഹ ജോടിയിലെ ഭർത്താവാണ് Z. W-ന്റെ സഹോദരനായ V. ഒരു ചെസ്സ് കളിക്കാരനോ ക്രിക്കറ്റുകളിക്കാരനോ അല്ല Y. Vയുടെ കൂട്ടുകാരനും ക്രിക്കറ്റുകളിക്കാരനുമാണ്.

16 ആരാണ് ഫുഡ്ബോൾ കളിക്കാരൻ

A. X B. U C. Y D. Z

17. ആരാണ് ചെസ്സ് കളിക്കാരി ?

A U B V C. W D. X

18. ആരാണ് 'Z' ന്റെ ഭാര്യ ?

A. W B V C. U D. Y

19. ആരെല്ലാമാണ് സ്ത്രീകൾ

A. UXV B. VYX C. XZY D. UXW

20. ആരെല്ലാമാണ് പുരുഷന്മാർ ?

A. XUY B. UXV C VYZ D. WXZ

Appendix VII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

VERBAL GROUP TEST OF INTELLIGENCE

Dr. P.K. Sudheesh Kumar
Hameed, A. & Prasanna A.

This test is prepared to test the mental abilities of children. This test includes 5 sub tests. Before writing the answer, read the instructions carefully given in the beginning of each sub test. The mode of answering is explained with example. You should start answering only after the instruction is given, and try to complete within the stipulated time. Don't write or mark anything on this question booklet. Mark your response only in the Response sheet provided.

TEST - I VERBAL ANALOGY

In this section, for each question, three words are given. You have to write the fourth word. By understanding the relationship between the first word and second word from the given three words; Select the fourth word from the alternatives A,B,C and D and mark it on the response sheet provided.

Example:

Thirst : Water :: Hunger : .....
A. meat B. Leisure C. Food D. Weariness

We drink water when we have thrist. Like wise we take food when we are hungry. Hence the correct answer is "C".

A B C D

1. Clever: Fox :: Foolishness :: .....
   A. Monkey B. Bear C. Deer D. Ass

2. Mercy : Cruelty :: Silence: .....
   A. Serene B. Noise C. Calmness D. Meditation

3. Drama : Director :: Newspaper .....
   A. Manager B. Editor C. Owner D. Press

4. Ship : Captain :: Aeroplane : .....
   A. Sea B. Airport C. Driver D. Pilot

5. Cry : Laugh :: Sadness: .....
   A. Happiness B. Energetic C. Harmony D.Peace

6. Shirt : Cloth :: Chappals : .....
   A. Chisel B. Leather C. Cobbler D. Tailor

7. Crow : Black :: Swan : .....
   A. Bird B. Water C. White D. Grey

8. Magazine : Reader :: Radio: .....
A. Advertisers B. Announcers C. Spectators D. Listners

9. Firewood : Axe :: Cloth : .....
A. Machine B. Needle C. Scissors D. Thread

10. Student : Classroom :: Player: .....
A. Stadium B. Competition C. Coach D. Game

11. House : Roof :: Earth : .....
A. Air B. Sky C. Atmosphere D. Poles

12. Child : Parents :: Book : .....
A. Teacher B. Publisher C. Press D. Author

13. Year : Month :: Week .....
A. Hour B. Minute C. Two weeks D. Day

14. Night : Day :: Hatred: .....
A. Help B. Mercy C. Love D. Failure

15. Poet : Poem :: Music: .....
A. Composer B. Writer C. Producer D. Conductor

16. Snow : White :: Coal : .....
A. Smoke B. Red C. Black D. Yellow

17. Cow : Animal :: Hen: .....
A. House : B. Bird C. Egg D. Nest

18. Swimming : Water :: Skating: .....
A. Ice B. Sky C. Mountain D. Space

19. Man : Autobiography :: Nation: .....
A. People B. Population C. Geography D. History

20. Medicine : Disease :: Book: .....
A. Knowledge B. Teacher. C. Author D. Publisher

TEST II VERBAL CLASSIFICATION

In this section, for each question, four words are given, of which, three can be grouped together findout the fourth word, and mark it on the response sheet.

Example

1. A. Sweetness B. Chilly C. hotness D. Bitterness.

Among these words, A,C and D denote different tastes. B (chilly) is not included in this category. So the right answer is 'B'.

	A	B	C	D
1.	A. Teacher	B. Principal	C. Student	D. Professor
2.	A. Bus	B. Aeroplane	C. Bicycle	D. Lorry
3.	A. Walking	B. Thinking	C. Swimming	D. Jumping
4.	A. Circle	B. Square	C. Triangle	D. Hexagon
5.	A. Beauty	B. Senility	C. Chap	D. Youth
6.	A. Grain	B. Kilogram	C. Metre	D. Quintal
7.	A. Peace	B. Sound	C. Meditation	D. Stillness
8.	A. Director	B Actor	C. Singer	D. Orator
9.	A. Day	B. Calender	C. Month	D. Week
10.	A. Quintal	B. Inch	C. Mile	D. Feet
11.	A. Tongue	B. Eye	C. Teeth	D. Nose
12.	A. Wheat	B. Raggy	C. Paddy	D. Pie
13.	A. Snake	B. Whale	C. Chameleon	D. Tortoise
14.	A. Pencil	B. Umbrella	C. Paint	D. Canvas
15.	A. Mango tree	B. Jack fruit tree	C. Coconut tree	D. Teak
16.	A. Mango	B. Apple	C. Tomato	D. Potato
17.	A. Ear	B. Finger	C. Hand	D. Leg
18.	A. Hen	B. Goat	C. Cow	D. Crow
19.	A. Office	B. House	C. Bungalow	D. Hut
20.	A. Announcers	B. Spectators	C. Lyricist	D. Listeners

TEST III NUMERICAL REASONING

For the 6 items given below, certain numbers are given in particular orders. For each item four alternatives are given as A, B, C and D. Find out the right answer and mark it on the answer sheet.

Example:

1. 2, 4, 6, ——, 10
   A. 5 B. 8 C. 7 D. 11

A	B√	C	D

1. 4, 9, 16, 25, 36————
   A. 39 B. 47 C. 49 D. 59

2. 25, 24, 22, 19, ———, 10
   A. 15 B. 16 C. 17 D. 14

3. 6, 8, ——, 20, 36
   A. 15 B. 14 C. 16 D. 12

4. 2, 6, 12, 20, 30, ——
   A. 42 B. 46 C. 40 D. 36

5. 3, 3, 6, 18, ——
   A. 68 B. 33 C. 72 D. 29

6. 0 2, 4, 6, ——, 10
   A. 7 B. 5 C. 8. D. 9

For the questions 7 to 10, four numerals are given. Find out the numeral that is not related to the other three and mark it on the response sheet provided.

Example:

A: 1 B: 3 C: 6 D: 7

A, B and D are the odd numbers whereas C is not an odd number. Therefore the answer is 'C'.

	A	B	C√	D
7.	A. 1	B. 5	C. 25	D. 75
8	A 3	B. 4	C. 7	D. 9
9.	A. 12	B. 24	C. 35	D. 48
10.	A. 150	B 36	C 12	D 4

For the questions 11 to 20 three numbers are given. You have tofind out the fourth number from the given three numerals. There is a relationship between the first two. Select the most appropriate numeral to the third one from the numerals A, B, C and D.

Example:

1. 1 : 2 :: 2 : .....

A. 6 B. 4 C. 1 D. 5

Two is the double of one. Similarly four is the double of two. Therefore the answer is 'B'.

	A	B√	C	D
11.	3 : 5 :: 11 : ———			
	A. 12	B. 13	C. 14	D. 15
12.	5 : 25 : : 3 : ———			
	A. 6	B. 12	C. 15	D. 9
13.	1 : 6 : : 7 : ———			
	A. 12	B. 13	C. 11	D. 14
14	10 : 20 : : 18 ———			
	A. 26	B 36	C. 46	D. 32
15	4 : 5 : : 8 : ———			
	A 6	B 7	C. 5	D 9
16	12 : 72 : : 6 : ———			
	A. 58	B 38	C. 46	D 52
17.	12:4 : : 24 : ———			
	A 6	B 10	C 8	D 12
18	28 : 22 : : 46 : ———			
	A. 40	B. 38	C. 42	D. 29
19	49 : 7 : : 4 : ———			
	A. 16	B. 8	C. 2	D 12
20.	48 : 8 : : 18 : ———			
	A. 8	B. 4	C. 2	D. 3

TEST - IV - VERBAL REASONING

For each question in this section four alternatives are given as A,B,C, and D. Read the questions carefully and mark the answers on the response sheet provided.

Example:

1. Bindu is fatter than Sindhu. Manju is not so fat as Bindu. . Manju and Sandhya are equally fat. Then who among them is the fattest?

   A. Manju B. Bindu C. Sindhu D. Sandhya

   A B C D

1. Appu sings better than Chippu. Devan can't sing as good as Kannan Kannan can sing better than Appu. Who is the best singer among them?

   A. Appu B. Kannan C. Chippu D. Devan

2. Raman is walking behind Rama. Ramani is walking behind Rama but infront of Raman. Raju is walking in front of Ramani. Then who is walking behind everybody?

   A. Raman B. Ramani C. Rama D. Raju

3. Ajay works more than Vijay. Asok and Ajithhavethe same capacity to work. Vijay works better than Asok. Who is the hard worker?

   A. Asok B. Ajith C. Vijay D. Ajay

4. Ramya cannot dance as Bhavya. Divya can dance, better than Bhavya. Vidya's performance in dance is better than Divya's. Then who is the top dancer?

   A. Divya B. Bhavya C. Ramya D. Vidya

5. If the son of Mohanan is the father of Deepak. What is the relationship between Deepak and Mohanan?

A. Son B. Brother C. Nephew D. Grandson

6. Rafeeq has better eye sight than Muneer. Shameer has less sight than that of Sudheer. Sudheer doesn't have sight as that of Rafeeq. Who among these have more eye sight ?

A. Sudheer B. Shameer C. Rafeeq D. Muneer

7. If two persons have completed a job within 10 days, what amount of job can one do in one day?

A. 1/2 B 1/5 C. 1/10 D. 1/20

8. If the sound of a gunfire takes 2 minutes to reach from place A to place B, how much time the sounds of five gunfire will take to reach from place A to B?

A. 10 minutes B. 2 minutes C. 4 minutes D. 5 minutes

9. Sharmila is younger than Mala. Kunjan and Nanda are of the same age. Sudheesh is younger than Nanda and older than Sharmila. Mala is not as old as Sudheesh. Then who is the oldest one?

A. Sudheesh B. Mala C. Sharmila D. Kunjan

10. There are 70 students in a queue for remitting the fees. If the place of Mohan is 54th from the Window how many students are there behind Mohanan?

A. 15 B. 16 C. 17 D.18

11. If South-West is North, what will be the North-East?

A. West B. South west C. East west D. South

12. A is the son of B. B and C are sisters. D is the mother of C and E is the son of D. Then, which is right among the following?

A. E is the uncle of A
B. C and E are brother and sister
C. C is the grandmother of A
D. A and E are brothers.

13. There are 80 employees in a company in which 1/4 of them have a car 1/2 of them have scooter and 1/10 of them have both car and scooter. Then how many of them are there without a car or scooter?

A. 12 B. 32 C. 30 D. 28

14. In a class having a strength of 51 students, the rank of Akhil is 21st. When counted from the least ranked student, what will be the rank of Akhil?

A. 12 B. 30 C. 31 D. 35

15. A person started his journey from the place, X. After walking 4 miles towards east he turned left and again walked 5 miles. Then he turned left and walked two miles. Then, to which direction he is walking now?

A. North B. West C. East D. South

16. F is the brother of A and C is the daughter of A. K is the sister of F and G is the brother of C. Among them who is the uncle of 'G'.

A. F B. C C. K D. A

17. Jinu is two years elder than Vinu and have three times the age of Minu? If, the ;sum of the age of 3 persons is 27, what is the age of Jinu?
A. 5 B. 3 C. 9 D. 10

18. If the place of X, who is standing in a queue in front of a Maveli store, from the front is 22 and from the back is 28. How many persons are there in the queue?
A. 49 B. 52 C. 50 D. 54

19. A is taller than B and B is shorter than X. X and Y are of the same length. If Z is taller than A, then who is the shortest one?

A. X B. Y C. A D. B

20. If father of Syam is the son of Sajjay, what is the relationship ;between Syam and Sajjay.

A. Son B. Grandson C. Brother D. Nephew.

TEST - V - COMPREHENSION

In this section, for every question, some statements are given. Four alternatives are given for every question as A, B, C and D. Read the statements carefully and find out the answers and mark it on the answer sheet provided.

Example:

Satheesh has two sons. A and B and two daughters C and D. Shyama has two children X and Y. Manoj has two children namely E and F and they are employed in a company. A and D are married. X married C and F married A. Manoj is the brother of Shyama.

Question:

1. What is the relationship between X and E?

A. Father and Son
B. Brother and Sister
C. Cousins
D. Father and daughter

A	B	C	D

1) W, X, Y and Z are the members of a home. Among them W, X and Y are educated and W, Y and Z are honest. Y and Z are employed and W, X and Z have humility

1. Who have education and honesty, but is not employed?

A. W. B. X C. Y D. Z

2. Who is honest, educated and employed?

A. W. B. X C. Y D. Z

3. Who is honest and employed but does not have education?

A. W. B. X C. Y D. Z

4. Who has education and humility, yet not with honesty and employment

A. W. B. X C. Y D. Z

5. Who doesn't have education, even if he is humble, honest and employed.

A. W. B. X C. Y D. Z

2) Dinesh has a daughter namely A and two sons namely B and C. Shyam has two sons namely P and Q and a daughter R. P and C are married and they have two sons, M and N. Rohit is the father of both S and T. T and B are married and they have two daughters D and E and a son G.

6. What is the relationship between Q and N.

A. Father B. Grandfather C. Uncle D. Son

7. What is the relationship between Dinesh and E?

A. Grandfather B. Uncle C. Father D. Son

8. What is the relationship between M and R?

A. Mother B. Daughter C. Niece D. Aunt

9. What is the relationship between B and G?

A. Daughter B. Mother C. Aunt D. Niece

10. What is the relationship between E and S?

A. Grandson B. Uncle C. Niece D. Father

3. If 5 PQ8 = 5^2 + 8 = 25 + 8 = 33

11. 4 PQ 4 = ?

A. 16 B. 20 C. 24 D. 12

12. 4 PQ 1 = ?

A. 17 B. 12 C. 8 D. 9

13. 5 PQ 5 = ?

A. 20 B. 30 C. 24 D. 12

14. 6 PQ ? = 108

A. 72 B. 30 C. 15 D. 25

15. ? PQ9 = 109

A. 50 B. 25 C. 20 D. 10

4) U, V, W, X, Y and Z are the members of a home. One among them is a football player and another one, a chess player. The third person is a cricket player. U and X are unmarried women and they do not participate in any game. No women are engaged in playing football or in cricket. Z is the husband of a married couple. V, the brother of W is not a chess player or a cricket player Y, is the friend of 'V' and a cricket player.

16. Who is the football player?

A. X B. U C. Y D. Z

17. Who is the chess player?

A. U B. V C. W D. X

18. Who is the wife of 'Z' ?

A. W B. V C. U D. Y

19. Who are the ladies?

A. UXV B. VYX C. XZY D. UVW

20. Who are the gents?

A. XUY B. UXV C. XYZ D. WXZ

Appendix VIII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

VERBAL GROUP TEST OF INTELLIGENCE

RESPONSE SHEET

Name:..... Class:..... Age:.....

School: Government/Private ..... Boy/Girl:.....

Sl. No	ANSWERS				Sl. No	ANSWERS				Sl. No	ANSWERS				Sl. No	ANSWERS				Sl. No	ANSWERS			
1	A	B	C	D	1	A	B	C	D	1	A	B	C	D	1	A	B	C	D	1	A	B	C	D
2	A	B	C	D	2	A	B	C	D	2	A	B	C	D	2	A	B	C	D	2	A	B	C	D
3	A	B	C	D	3	A	B	C	D	3	A	B	C	D	3	A	B	C	D	3	A	B	C	D
4	A	B	C	D	4	A	B	C	D	4	A	B	C	D	4	A	B	C	D	4	A	B	C	D
5	A	B	C	D	5	A	B	C	D	5	A	B	C	D	5	A	B	C	D	5	A	B	C	D
6	A	B	C	D	6	A	B	C	D	6	A	B	C	D	6	A	B	C	D	6	A	B	C	D
7	A	B	C	D	7	A	B	C	D	7	A	B	C	D	7	A	B	C	D	7	A	B	C	D
8	A	B	C	D	8	A	B	C	D	8	A	B	C	D	8	A	B	C	D	8	A	B	C	D
9	A	B	C	D	9	A	B	C	D	9	A	B	C	D	9	A	B	C	D	9	A	B	C	D
10	A	B	C	D	10	A	B	C	D	10	A	B	C	D	10	A	B	C	D	10	A	B	C	D
11	A	B	C	D	11	A	B	C	D	11	A	B	C	D	11	A	B	C	D	11	A	B	C	D
12	A	B	C	D	12	A	B	C	D	12	A	B	C	D	12	A	B	C	D	12	A	B	C	D
13	A	B	C	D	13	A	B	C	D	13	A	B	C	D	13	A	B	C	D	13	A	B	C	D
14	A	B	C	D	14	A	B	C	D	14	A	B	C	D	14	A	B	C	D	14	A	B	C	D
15	A	B	C	D	15	A	B	C	D	15	A	B	C	D	15	A	B	C	D	15	A	B	C	D
16	A	B	C	D	16	A	B	C	D	16	A	B	C	D	16	A	B	C	D	16	A	B	C	D
17	A	B	C	D	17	A	B	C	D	17	A	B	C	D	17	A	B	C	D	17	A	B	C	D
18	A	B	C	D	18	A	B	C	D	18	A	B	C	D	18	A	B	C	D	18	A	B	C	D
19	A	B	C	D	19	A	B	C	D	19	A	B	C	D	19	A	B	C	D	19	A	B	C	D
20	A	B	C	D	20	A	B	C	D	20	A	B	C	D	20	A	B	C	D	20	A	B	C	D

Appendix IX

UNIVERSITY OF CALICUT

Department of Education

ACHIEVEMENT TEST IN MALAYALAM LANGUAGE
(Standard VII)
(Draft)

Dr. P.K.Sudheesh Kumar P.Sasidharan

നിർദ്ദേശങ്ങൾ

ഇതൊരു മലയാളം പരീക്ഷയാണ്. ചോദ്യക്കടലാസിൽ ഒന്നും എഴുതരുത്. ഉത്തരങ്ങൾ എഴുതുന്നതിന് വേറെ കടലാസു തന്നിട്ടുണ്ട്. ഓരോ ചോദ്യവിഭാഗത്തിനും, തന്നിട്ടുള്ള നിർദ്ദേശമനുസരിച്ച് ഉത്തരമെഴുതുക. ഉത്തരങ്ങൾ മാത്രം എഴുതിയാൽ മതി.

(1 മുതൽ 20 വരെയുള്ള ചോദ്യങ്ങൾ വിട്ടഭാഗം പൂരിപ്പിക്കാനുള്ളതാണ്. ഓരോന്നിനും താഴെകൊടുത്തിരിക്കുന്ന ഉത്തരങ്ങളിൽനിന്ന് ഏറ്റവും ശരിയായത് തിരഞ്ഞെടുക്കുക.) (20 X 1=20 *മാർക്ക്*)

1. ജീവശാസ്ത്രവും സാങ്കേതികവിദ്യയും കൂടിച്ചേരുന്ന ഒരു ശാസ്ത്രശാഖയാണ് .....

   എ. ബയോളജി. ബി. ബയോടെക്നോളജി
   സി. ബയോകെമിസ്ട്രി ഡി. ടെക്നിക്കൽ ബയോളജി

2. രാജസന്നിധിയെ തണുപ്പിക്കാൻ പെൺകുട്ടികൾ ..... രാഗം ആലപിച്ചു.

   എ. ദീപക് ബി. ഹിന്ദോളം
   സി. ബിലാവൽ ഡി. മേഘമല്ലാർ

3. ..... അടിസ്ഥാനമാക്കിയാണ് കവിതയിൽ വൃത്തങ്ങൾ രൂപപ്പെട്ടിട്ടുള്ളത്.

   എ. ഈണത്തെ ബി. ശബ്ദത്തെ
   സി. പദങ്ങളെ ഡി. താളത്തെ

4. 'നങ്ങേമക്കുട്ടി' എന്ന കവിതയുടെ കർത്താവ് ..... ആണ്.

   എ. ഒളപ്പമണ്ണ ബി. വൈലോപ്പിള്ളി
   സി. ജി.ശങ്കരക്കുറുപ്പ് ഡി. ഇടശ്ശേരി

5. പാരമ്പര്യത്തെ നിർണയിക്കുന്ന ഘടകമാണ് .....

   എ. ജീൻ ബി. കോശം
   സി. രക്തം ഡി. ലിംഫ്

6. കാശ്മീരിലൂടെ ഒഴുകുന്ന ഒരു നദിയാണ് .....

   എ. നർമ്മദ ബി. ഝലം
   സി. വൂളാർ ഡി. താപ്തി

7. ശങ്കരവർമ്മൻ ഭരിച്ചിരുന്ന കാലത്ത് കാശ്മീരിന്റെ തലസ്ഥാനമായിരുന്നു .....

   എ. ശ്രീനഗർ ബി. ദാൽ
   സി. ഗുൽമാർഗ് ഡി. പട്ടൻ

8. കാശ്മീരിലെ ഏറ്റവും പ്രശസ്തമായ ഉദ്യാനമാണ് .....

   എ. ചശ്മാശാഹി ബി. നിഷാർത്ത് ബാഗ്
   സി. ഹസ്റത്ത് ബാൽ ഡി. ഷാലിമാർ

9. "ഓമനത്തിങ്കൾ കിടാവോ....." – എന്നു തുടങ്ങുന്ന പാട്ട് ഒരു ..... ആണ്.

   എ. നാടൻപാട്ട് ബി. താരാട്ടു പാട്ട്
   സി. വടക്കൻപാട്ട് ഡി. തിരുവാതിരക്കളിപ്പാട്ട്

10. ഒരാൾ മറ്റൊരാളുടെ ജീവിതത്തെക്കുറിച്ച് എഴുതുന്നതാണ് .....

എ. ആത്മകഥ ബി. അനുസ്മരണക്കുറിപ്പ്

സി. ജീവചരിത്രം ഡി. ജീവിതാനുഭവങ്ങൾ

11. വിക്ടർ ഹ്യൂഗോയുടെ ലാമിറാബിലെ ..... ഭാഷയിൽ എഴുതിയ കൃതിയാണ്.

എ. ഇംഗ്ലീഷ് ബി. സ്പാനിഷ്

സി. ഫ്രഞ്ച് ഡി. റഷ്യൻ

12. മുന്തിരിച്ചാറ് വീഞ്ഞായി മാറുന്ന പ്രവർത്തനത്തെ ..... എന്നുപറയുന്നു.

എ. കിണ്വനം ബി. കഥനം

സി. ത്വരണം ഡി. ഖാദനം

13. ചിനാർ മരങ്ങളുടെ തറവാട് ..... ആണ്.

എ. റഷ്യ ബി. മലേഷ്യ

സി. പേർഷ്യ ഡി. പ്രഷ്യ

14. കണ്ണന്റെ ഗാനം കേട്ടപ്പോൾ പുഴയിലെ മീനുകൾ .....

എ. അനങ്ങാതെ കേട്ടുനിന്നു. ബി. വെള്ളത്തിൽ തുള്ളിക്കളിച്ചു.

സി. കരയിൽ കയറി കണ്ണന്റെ മുന്നിലെത്തി. ഡി. നീന്തിരസിച്ചു.

15. സസ്യങ്ങളിലെ ടിഷ്യൂകൾച്ചറിന് സമാനമായ ഒരു സാങ്കേതിക വിദ്യ ജന്തുക്കളിലും വിജയകരമായി പരീക്ഷിക്കപ്പെട്ടു. ഇതാണ്.....

എ. ജീൻ തെറാപ്പി ബി. ജെനിറ്റിക്സ്

സി. കാസ്റ്റിങ് ഡി. ക്ലോണിങ്

16. "മാവേലിയാം വരവതുണ്ടേ." – എന്തിനാണ് മാവേലി വരുന്നത് ?

എ. ദുഷ്ടരെ വകവരുത്താൻ ബി. ഇപ്പോഴത്തെ ഭരണാധികാരിയെ നേരിട്ടുകാണാൻ

സി. മനുഷ്യജീവിതം നേരിട്ടുകാണാൻ ഡി. ഓണം ആഘോഷിക്കാൻ

17. കൈനിക്കരയുടെ അഭിപ്രായത്തിൽ യുദ്ധവിജയത്തിനുവേണ്ടി ആഹൂതി ചെയ്യപ്പെടുന്നവയിൽ ഏറ്റവും മഹത്തായ ഒന്നാണ് .....

എ. സമാധാനം ബി. സംസ്കാരം

സി. മനുഷ്യത്വം ഡി. സ്നേഹം

18. കേരളത്തിന്റെ സാംസ്കാരിക ചരിത്രവുമായി ബന്ധിപ്പിക്കാൻ കഴിയാത്ത ഒരു കലയാണ് .....

എ. കഥകളി ബി. കൂച്ചിപ്പുടി

സി. മോഹിനിയാട്ടം ഡി. തുള്ളൽ

19. "തീക്കും തന്നുള്ളിലേ തോന്നിത്തുടങ്ങിതേ
തീക്കായ വേണമെനിക്കുമെന്ന് " – ഇങ്ങനെ ഒരവസ്ഥ വന്നാൽ .....

എ. എല്ലാവർക്കും സുഖമായി ജീവിക്കാം. ബി. ആർക്കും തീയിനെ പേടിയുണ്ടാവില്ല.

സി. ആർക്കും ജീവിക്കാൻ സാധ്യമല്ല. ഡി. രോഗമുള്ളവർക്ക് ജീവിക്കാൻ സാധ്യമല്ല.

20. ഉറച്ച കാൽവയ്പ്പോടെയാണ് താൻസെൻ അക്ബർ ചക്രവർത്തിയുടെ വേദിയിൽ പ്രവേശിച്ചത്; കാരണം .....

എ. അദ്ദേഹം ആരോഗ്യവാനായിരുന്നു.

ബി. സംഗീതത്തിന്റെ കാര്യത്തിൽ അദ്ദേഹത്തിന് ആത്മവിശ്വാസമുണ്ടായിരുന്നു.

സി. അദ്ദേഹം ചെറുപ്പമായിരുന്നു.

ഡി. വേദിയിൽ തന്റെ മകളുണ്ടെന്ന് അദ്ദേഹത്തിനറിയാമായിരുന്നു.

(21 മുതൽ 60 വരെയുള്ള ചോദ്യങ്ങൾക്ക്, ശരിയുത്തരം, ഓരോന്നിനും താഴെ കൊടുത്തിട്ടുള്ളവയിൽനിന്ന് തിരഞ്ഞെടുക്കുക.) (40 X 1=40*മാർക്ക്*)

21. കഥപറച്ചിലിൽ തകഴി അനുകരിച്ചിരുന്നത് ആരെയായിരുന്നു?

എ. തന്റെ അച്ഛനെ ബി. ഉമ്മൻസാറിനെ

സി. രാഘവപ്പണിക്കരെ ഡി. കൊച്ചുനീലകണ്ഠപ്പിള്ളയെ

22. താഴെ പറയുന്നവരിൽ ആർക്കാണ് ഓണസങ്കല്പങ്ങളുമായി ബന്ധമില്ലാത്തത്?

എ. പാക്കനാർ ബി. വാമനൻ
സി. മഹാബലി ഡി. ദേവേന്ദ്രൻ

23. 'പ്രത്യക്ഷം' - ഇതിന്റെ വിപരീത പദമേത്?

എ. സമക്ഷം ബി. പ്രതിപക്ഷം
സി. പരോക്ഷം ഡി. മോക്ഷം

24. 'അജപാലകർ' - ഈ പദത്തിന്റെ അർത്ഥമെന്ത്?

എ. പശുവിനെ പാലിക്കുന്നവർ ബി. ആട്ടിടയന്മാർ
സി. ആനപ്പാപ്പാന്മാർ ഡി. ആട്ടിൻപാൽ കുടിക്കുന്നവർ

25. 'വാചാമഗോചരം' - ഈ പദത്തിന്റെ അർത്ഥമെന്ത്?

എ. വാക്കുകൊണ്ടുവിവരിക്കാനാവാത്തത്. ബി. വായനകൊണ്ടു മനസ്സിലാക്കാനാവാത്തത്
സി. കണ്ണുകൊണ്ടുകാണാൻ കഴിയാത്തത്. ഡി. കാതുകൊണ്ടു കേൾക്കാനാവാത്തത്.

26. "പാട്ടു കഴിഞ്ഞൊരു ഗന്ധർവൻ വച്ചതാം
ചേങ്കില പോലെ മയങ്ങുന്നു" - എന്ത്?

എ. സൂര്യൻ ബി. ചന്ദ്രൻ
സി. ഭൂമി ഡി. വീണ

27. "പുഞ്ചനിലത്തിലെ പുൽക്കൊടിത്തുമ്പിലെ
മഞ്ഞിൻതുള്ളി വശത്താക്കി" - ആര്?

എ. കുട്ടി ബി. ഭൂമി
സി. സൂര്യൻ ഡി. കാറ്റ്

28. 'വിഹായസ്സ്' - ഈ പദത്തിന്റെ അർത്ഥമെന്ത്?

എ. കൂടിയ ആയുസ്സ് ബി. സൂര്യൻ
സി. ആകാശം ഡി. വിശാലമായ മനസ്സ്

29. കുട്ടിക്കാലത്ത് തകഴിക്ക് കഥകളി കാണുന്നതിലുമധികം രസം തുള്ളൽ കാണുന്നതിലായിരുന്നു. എന്തുകൊണ്ട്?

എ. കഥകളി ഇഷ്ടമായിരുന്നില്ല.
ബി. കഥകളി മുഴുവൻ മനസ്സിലാക്കാൻ കഴിഞ്ഞിരുന്നില്ല.
സി. തുള്ളൽ കുറച്ചുസമയമേ ഉണ്ടായിരുന്നുള്ളൂ.
ഡി. ഉറക്കമൊഴിക്കാൻ ഇഷ്ടമായിരുന്നില്ല.

30. കൈനിക്കരയുടെ അഭിപ്രായത്തിൽ യഥാർത്ഥ വിജയമെന്നാലെന്താണ്?

എ. യുദ്ധം ചെയ്യാതിരിക്കുന്നത് ബി. യുദ്ധത്തിൽ ജയിക്കുന്നത്
സി. യുദ്ധത്തെ ജയിക്കുന്നത് ഡി. യുദ്ധം ചെയ്യാതെ ജയിക്കുന്നത്

31. "ബിഷപ്പിന്റെ വെള്ളിപ്പാത്രങ്ങൾ മോഷ്ടിക്കാൻ തീരുമാനിച്ചതിനുശേഷവും മറ്റൊരു ചിന്തയിൽപ്പെട്ട് ജീനിന്റെ മനസ്സ് ആടിക്കൊണ്ടിരുന്നു." - എന്തായിരിക്കാം അത്?

എ. ബിഷപ്പിന്റെ സന്മനസ്സിനോടുള്ള ആദരവ്
ബി. പോലീസ് പിടിക്കുമോയെന്ന ഭയം
സി. സഹോദരിയെക്കുറിച്ചുള്ള വിചാരം
ഡി. ആരെങ്കിലും കാണുമോ എന്ന ശങ്ക

32. ആ വിചാരം ജീനിന് ഒരു ബാധോപദ്രവം പോലെയായിത്തീർന്നു. ഏതു വിചാരം?

എ. സഹോദരിയെക്കുറിച്ചുള്ള വിചാരം
ബി. ബിഷപ്പിന്റെ വെള്ളിപ്പാത്രങ്ങളെക്കുറിച്ചുള്ള വിചാരം
സി. ജയിൽ ജീവിതത്തെക്കുറിച്ചുള്ള വിചാരം
ഡി. ഭാവിയെക്കുറിച്ചുള്ള വിചാരം

33. 'നവീനം' - ഈ പദത്തിന്റെ വിപരീതാർത്ഥം വരാത്ത പദമേത്?

എ. പുരാതനം ബി. പുരോഗമനം
സി. പുരാണം ഡി. പഴയത്

34. 'സുന്ദരദൃശ്യം' - ഇതിന്റെ വികസിത രൂപമേത്?

എ. സൗന്ദര്യത്തിന്റെ ദൃശ്യം ബി. സുന്ദരവും ദൃശ്യവുമായ

സി. സുന്ദരമായ ദൃശ്യം ഡി. ദൃശ്യമായ സൗന്ദര്യം

35. 'ജലവിതാനം' - ഈ പദം വിഗ്രഹിക്കുന്നതെങ്ങനെ?

എ. ജലംകൊണ്ടുള്ള വിതാനം ബി. ജലത്തിലെ വിതാനം

സി. ജലവും വിതാനവും ഡി. ജലത്തിന്റെ വിതാനം

36. 'ഭിക്ഷ ചോദിക്കുന്നവൾ' - ഈ അർത്ഥം വരുന്ന പദമേത്?

എ. ഭിക്ഷു ബി. ഭിക്ഷുകി

സി. ഭിക്ഷിണി ഡി. ഭിക്ഷിനി

37. "കുരിരുട്ടിന്റെ കിടാത്തിയെന്നാൽ
സൂര്യപ്രകാശത്തിനുറ്റ തോഴി" - ആരാണീ തോഴി?

എ. ദാസി ബി. പകൽ

സി. കറുപ്പ് ഡി. കാക്ക

38. "ഓണം കേറാമൂല" - ഈ പ്രയോഗം എന്തിനെക്കുറിച്ചുള്ളതാണ്?

എ. ഓണം ആഘോഷിക്കാത്ത സ്ഥലത്തെക്കുറിച്ച് ബി. ഒറ്റപ്പെട്ട സ്ഥലത്തെക്കുറിച്ച്

സി. ഉയർന്ന സ്ഥലത്തെക്കുറിച്ച് ഡി. പാതാളത്തെക്കുറിച്ച്

39. വെള്ളം കെട്ടിനിൽക്കാത്ത ഉയർന്ന പ്രദേശങ്ങളിൽ കാശ്മീരികൾ കുങ്കുമക്കൃഷി നടത്തുന്നു. നമ്മുടെ നാട്ടിൽ ഇത്തരം പ്രദേശങ്ങളിൽ ചെയ്യുന്ന കൃഷിയേത്?

എ. നെല്ല് ബി. വാഴ

സി. തെങ്ങ് ഡി. കുരുമുളക്

40. താഴെ കൊടുത്തിട്ടുള്ളവയിൽ ഒറ്റപ്പെട്ട പദമേത്?

എ. ആരാമം ബി. ഉദ്യാനം

സി. വേദിക ഡി. വാടിക

41. താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ശരിയായ പദമേത്?

എ. സൽകർമ്മം ബി. സല്കർമ്മം

സി. സത്കർമ്മം ഡി. സൽക്കർമ്മം

42. 'പൊൽത്താമര' - ഈ പദം പിരിച്ചെഴുതുന്നതെങ്ങനെ?

എ. പൊൽ+താമര ബി. പൊൽ+ത്താമര

സി. പൊൻ+ത്താമര ഡി. പൊൻ+താമര

43. താഴെ പറയുന്നവയിൽ കൂട്ടത്തിൽ ചേരാത്തതേത്?

എ. നടത്തം ബി. കിടത്തം

സി. പഠിത്തം ഡി. ആണത്തം

44. 'ദിനരാത്രങ്ങൾ' - ഇതിനു സമാനമായ പ്രയോഗമേത്?

എ. ഇരുകാലുകൾ ബി. കൈകാലുകൾ

സി. നാൽക്കാലികൾ ഡി. പൊയ്ക്കാലുകൾ

45. ചോദ്യ+ഉത്തരം - ഇതിന്റെ സംയുക്ത രൂപം തിരഞ്ഞെടുക്കുക.

എ. ചോദ്യുത്തരം ബി. ചോദ്യോത്തരം

സി. ചോദ്യൂത്തരം ഡി. ചോദ്യവും ഉത്തരവും

46. യൂറോപ്പിൽ തണുപ്പുകാലത്ത് കൂലിപ്പണിക്കാർക്ക് പണി കുറവായിരിക്കും. ഏതവസരത്തിലാണ് നമ്മുടെ നാട്ടിലെ കൂലിപ്പണിക്കാർക്ക് ഇത്തരമൊരവസ്ഥ ഉണ്ടാവുന്നത് ?

എ. മഞ്ഞുകാലത്ത് ബി. കർക്കിടകത്തിലെ മഴക്കാലത്ത്

സി. തുലാവർഷക്കാലത്ത് ഡി. കൊടിയ വേനൽക്കാലത്ത്

47. 'കള്ളൻ', 'ഇരുളും വെളിച്ചവും' എന്നീ കഥകളിലെ മുഖ്യ കഥാപാത്രങ്ങൾ താഴെ പറയുന്നവയിൽ ഏതുകാര്യത്തിൽ സമാനരാണ്?

എ. രണ്ടുപേരും ഒരേ പ്രായമുള്ളവരായിരുന്നു.

ബി. മോഷണം ഇരുവർക്കും ജന്മവാസനയായിരുന്നു.

സി. ദാരിദ്ര്യം രണ്ടുപേരെയും കള്ളന്മാരാക്കി.

ഡി. രണ്ടുപേരും സഹോദരിയുടെ കുഞ്ഞുങ്ങൾക്കുവേണ്ടിയാണ് മോഷ്ടിച്ചത്.

48. സമൂഹത്തെ സംബന്ധിക്കുന്നത് എന്ന അർത്ഥത്തിൽ താഴെ പറയുന്നവയിൽ ശരിയേത്?

എ. സാമൂഹ്യം ബി. സാമൂഹികം
സി. സാമൂഹ്യകം ഡി. സാമൂഹീകം

49. 'ശൃംഖല' - ഈ സംസ്കൃത പദത്തിനു സമാനാർത്ഥമുള്ള മലയാള പദമേത്?

എ. പൊങ്കാല ബി. ചങ്ങല
സി. ചേങ്കില ഡി. ചേമ്പില

50. ഇടവഴിയിലൂടെ നടന്നുപോകുമ്പോൾ, നഖത്തിനിടയിൽ മൊട്ടുസൂചി കയറ്റിയപ്പോഴും, തുടവ രഞ്ഞു കുരുമുളകു പൊടി തേച്ചപ്പോഴും തോന്നാത്ത ഒരു വേദന കള്ളന്റെ മനസ്സിൽ നിറഞ്ഞു. ഇതിനുകാരണമെന്തായിരിക്കാം?

എ. അപമാനഭാരം ബി. അതിയായ വിശപ്പ്
സി. തന്നെ വീട്ടുകാർ തിരിച്ചറിഞ്ഞിട്ടുണ്ടാവുമെന്ന പേടി. ഡി. ഭാവിയെക്കുറിച്ചുള്ള ചിന്ത

51. "ശിഥിലീകരിക്കുവാൻ വേണ്ടിയുള്ള ഐക്യം, വെറുക്കാൻ വേണ്ടിയുള്ള സ്നേഹം....." - കുമാരപ്പിള്ളയുടെ ഇത്തരം പ്രയോഗങ്ങളോട് പൊരുത്തപ്പെടാത്തത് താഴെ കൊടുത്തിരിക്കുന്നവ യിൽ നിന്ന് തിരഞ്ഞെടുക്കുക.

എ. അകലാൻ വേണ്ടിയുള്ള അടുപ്പം ബി. ഉയരാൻ വേണ്ടിയുള്ള താഴ്ച
സി. തോൽക്കാൻ വേണ്ടിയുള്ള പഠിത്തം ഡി. അഹങ്കരിക്കാൻ വേണ്ടിയുള്ള വിനയം

52. ബിഷപ്പിന്റെ മുറിയുടെ വാതിൽ എപ്പോഴും തുറന്നിട്ടിരിക്കുന്നതിനു കാരണമെന്തായിരിക്കും?

എ. ആ മുറിക്കുപൂട്ടില്ല.

ബി. മിക്കദിവസവും മുറി പൂട്ടാൻ ബിഷപ്പു മറക്കും.

സി. ഉറങ്ങാൻ ബിഷപ്പിനു ശുദ്ധവായു കിട്ടണം.

ഡി. ആർക്കും എപ്പോഴും അവിടേക്കു കയറിച്ചെല്ലാൻ സൗകര്യത്തിന്.

53. "മുഖത്ത് കരിയും ചെങ്കല്ലും തേച്ച് വേഷം കെട്ടിനിന്ന എന്നെ രണ്ടടിയടിച്ച് അമ്മ വിളിച്ചുകൊ ണ്ടുപോയി." - അമ്മ ശിവശങ്കരനെ തല്ലാൻ കാരണമെന്തായിരിക്കും?

എ. മകനോടുള്ള വിരോധം

ബി. കഥകളിയോടുള്ള വിരോധം

സി. രാത്രിയായിട്ടും വീട്ടിലെത്താത്തതിലുള്ള ദേഷ്യം

ഡി. രാത്രി ഉറക്കമൊഴിച്ചതിലുള്ള ദേഷ്യം

54. കൂട്ടത്തിൽ ചേരാത്തത് ഏത്?

എ. കടിക്കുക ബി. ചിരിക്കുക
സി. അടിക്കുക ഡി. വിരട്ടുക

55. അക്ബർ ചക്രവർത്തി, സ്വാതിതിരുനാൾ - ഇവരിരുവരും ഏതുകാര്യത്തിൽ സമാനരാണ്?

എ. സംഗീതജ്ഞരായിരുന്നു. ബി. ദീർഘകാലം രാജ്യം ഭരിച്ചു.
സി. സംഗീതത്തെ പ്രോത്സാഹിപ്പിച്ചു. ഡി. രാജ്യത്ത് യുദ്ധം നിരോധിച്ചു.

56. താഴെകൊടുത്തിട്ടുള്ളവയിൽ ശരിയായ പദമേത്?

എ. മനോസുഖം ബി. മനസ്സുഖം
സി. മന:സ്സുഖം ഡി. മനസുഖം

57. സച്ചിദാനന്ദന്റെ 'ബോധവതി' എന്ന കവിതയിലൂടെയും കുമാരനാശാന്റെ 'ചണ്ഡാലഭിക്ഷുകി' എന്ന കവിതയിലൂടെയും കടന്നുപോകുമ്പോൾ നാം എത്തിച്ചേരുന്ന പൊതുനിഗമനം എന്ത്?

എ. കുടിവെള്ളം കൊടുക്കുന്നതിന് ജാതിപ്രശ്നമാക്കേണ്ടതില്ല.

ബി. ജാതി ചിന്ത ഒഴിവാക്കേണ്ടതാണ്.

സി. ജാതി ചിന്ത അർത്ഥമില്ലാത്തതാണ്.

ഡി. ജാതി ചിന്ത അപകടകരമാണ്.

58. ജ്ഞാനപീഠ പുരസ്കാരം നേടിയ ആദ്യത്തെ മൂന്നു മലയാളികളുടെ പേരിലും പൊതുവായി ഒരു നാമമുണ്ട്. എന്താണത്?

എ. ശിവൻ ബി. ശങ്കരൻ
സി. കുറുപ്പ് ഡി. വാസുദേവൻ

59. "ഭർത്താവ് ഉണ്ടായിരുന്നിടത്തോളം കാലം സഹോദരിയാണ് ജീനിനെ വളർത്തിയതും സംരക്ഷിച്ചതും. ആ കടപ്പാട് അയാൾക്ക് മറക്കാൻ കഴിഞ്ഞിരുന്നില്ല." - ഇതു പ്രകടമാക്കുന്നതെന്ത്?

എ. ജീനിന് സഹോദരിയോടുള്ള സ്നേഹം ബി. ജീനിന്റെ ദയ
സി. ജീനിന്റെ മനുഷ്യത്വം ഡി. ജീനിന്റെ മഹത്വം

60. തന്റെ വെള്ളിപ്പാത്രങ്ങൾ മോഷ്ടിച്ച ജീനിന് വെള്ളിവിളക്കുകൾ കൂടി നൽകിയ ബിഷപ്പിന്റെ നടപടിയെക്കുറിച്ചുള്ള ചില പ്രതികരണങ്ങൾ താഴെ കൊടുക്കുന്നു. നിങ്ങൾക്കു സ്വീകാര്യമായത് തിരഞ്ഞെടുക്കുക.

എ. നന്നായി, ഇനി മറ്റൊരു കള്ളനും അതു മോഷ്ടിക്കുകയില്ലല്ലോ.

ബി. ശരിയായില്ല, അതു കള്ളന്മാരെ പ്രോത്സാഹിപ്പിക്കും.

സി. നന്നായി, കാരണം അത് ജീനിന്റെ മാനസാന്തരത്തിന് വഴിതെളിക്കും.

ഡി. ഉചിതമായി, കാരണം ബിഷപ്പുമാർ ആഡംബര വസ്തുക്കൾ ഉപേക്ഷിക്കേണ്ടതാണ്.

(61 മുതൽ 78 വരെയുള്ള ചോദ്യങ്ങൾക്ക് ഒന്നോ രണ്ടോ വാക്യത്തിൽ ഉത്തരമെഴുതുക.)

(18 X 2 = 36 മാർക്ക്)

61. ജനിതക എഞ്ചിനീയറിങ് എന്നാലെന്ത്?

62. അന്നവിചാരം, വനനശീകരണം - ഈ പദങ്ങളുടെ വികസിത രൂപമെഴുതുക.

63. അവൾ തേജസ്വിനിയാണ്. -ഈ വാക്യം അയാൾ എന്നു തുടങ്ങുന്ന വിധത്തിൽ മാറ്റിയെഴുതുക.

64. ചിനാർമരങ്ങൾ കാശ്മീരികൾക്ക് ശരീരസുഖം നൽകുന്നതെങ്ങനെ?

65. ഉമ്മൻസാറിന്റെ 'രചന' പീരിയഡ് എല്ലാ കുട്ടികൾക്കും ഇഷ്ടമായിരുന്നു. എന്തുകൊണ്ട്?

66. ഹനൂമാന്റെ പാട്ടു കേട്ടിരുന്ന നാരദന് ഒടുവിൽ ഇരുന്നിടത്തുനിന്ന് എണീക്കാൻ പറ്റാതായി. കാരണമെന്തായിരുന്നു?

67. "മകരക്കാറിലെത്തണ്ണീര്
മാനവന്മാരുടെ കണ്ണീര്."- ഈ വരികളുടെ ആശയം വിശദമാക്കുക.

68. 'ബോധവതി' - എന്ന കവിതയിൽ നിന്ന്, ചണ്ഡാലിനിക്കുണ്ടായ മന:പരിവർത്തനം സൂചിപ്പിക്കുന്ന വരികൾ എടുത്തെഴുതുക.

69. കാലാവസ്ഥയുമായി ബന്ധമുള്ള ഒരു പഴഞ്ചൊല്ല് എഴുതുക. അതിന്റെ ആശയം ഒരു വാക്യത്തിൽ വിശദമാക്കുക.

70. താനന ത്താനന ത്താനാ - തന

താനന ത്താനന ത്താനാ..... - ഈ വായ്ത്താരിക്കുയോജിക്കുന്ന രണ്ടുവരിപാട്ടെഴുതുക.

71. പണ്ട് ഒരു പ്രത്യേക പ്രദേശത്തുമാത്രം ഉപയോഗിച്ചിരുന്ന ഭാഷയല്ല സംസ്കൃതം. ഇന്ത്യ ഒട്ടാകെ അതിനു പ്രചാരമുണ്ടായിരുന്നു. ഭാരതസംസ്കാരത്തിന്റെ ഉറവിടമായ വേദങ്ങൾ, ഉപനിഷത്തുകൾ, ഇതിഹാസങ്ങൾ, ശാസ്ത്രങ്ങൾ എന്നിവയെല്ലാം സംസ്കൃതത്തിലാണ് ആദ്യമുണ്ടായത്. ദക്ഷിണ ഭാരതത്തിലെ ഭാഷകളിൽ ധാരാളം സംസ്കൃത ശബ്ദങ്ങൾ ചേർന്നു കിടപ്പുണ്ട്. മലയാളം, തെലുങ്ക്, കന്നഡ എന്നീ ഭാഷകളിലാണ് സംസ്കൃതത്തിന്റെ പ്രഭാവം ഏറെ കാണുന്നത്. തമിഴിൽ അതുവളരെക്കുറവാണ്. ഭാരതീയ ഭാഷകളെ കൂട്ടിയിണക്കുന്ന ബലിഷ്ഠമായ ഒരു കണ്ണിയാണ് സംസ്കൃതം.

ഈ ഖണ്ഡിക ചാർട്ടിൽ എഴുതി പ്രദർശിപ്പിക്കുന്നു. കുട്ടികൾ മൗനമായി രണ്ടുതവണവായിച്ച് ചോദ്യങ്ങൾ ഉണ്ടാക്കണം. (കുറഞ്ഞത് രണ്ടെണ്ണം)

72. കുഞ്ഞുങ്ങൾ വിശന്നുതളരുന്നത് സഹിക്കാനാവാതെ, ജീൻ ഒരു കടയിൽനിന്ന് റൊട്ടി മോഷ്ടിച്ചു. ജീനിന്റെ സ്ഥാനത്ത് നിങ്ങളായിരുന്നുവെങ്കിൽ എന്തുചെയ്യുമായിരുന്നു?

73. "സദാ നീറിക്കൊണ്ടിരുന്നു"

"സദാ സമയത്തും നീറിക്കൊണ്ടിരുന്നു." - ഈ രണ്ടു പ്രയോഗങ്ങളിൽ ശരിയേത്? എന്തുകൊണ്ട് ?

74. നാളിതുവരെ മനുഷ്യൻ നേടിയ സംസ്കാര സമ്പത്തുമുഴുവൻ പകർന്നുതരുന്നത് ഭാഷയാണ്. സംസാരിക്കുമ്പോൾ, പ്രസംഗിക്കുമ്പോൾ, കത്തെഴുതുമ്പോൾ, പരീക്ഷയെഴുതുമ്പോൾ, ലേഖനമോ പുസ്തകമോ എഴുതുമ്പോൾ – അപ്പോഴെല്ലാം, ഉള്ളിലിരിക്കുന്ന ആശയം ഭാഷയിലൂടെ പകർന്നു കൊടുക്കുകയാണ് നാം ചെയ്യുന്നത്. ഒരു വ്യക്തിയുടെ സ്വഭാവത്തെയും സംസ്കാരത്തെയും കുറിച്ച് സ്പഷ്ടമായ ധാരണ നൽകാൻ അയാൾ പറഞ്ഞ രണ്ടോ മൂന്നോ വാക്കുകൾക്കു കഴിഞ്ഞേക്കാം. ആദ്യമായിക്കണ്ടുമുട്ടുന്ന രണ്ടുപേരെ ആജീവനാന്ത സുഹൃത്തുക്കളാക്കാൻ ഏതാനും വാക്കുകൾ മതിയാകും. ഇതിൽ നിന്നെല്ലാം ഒരു കാര്യം വ്യക്തമാകുന്നു: സ്വന്തം ഭാഷ ആവുന്നത്ര മെച്ചപ്പെടുത്താൻ എല്ലാവരും ശ്രമിക്കേണ്ടതാണ്.

–ഈ ഗദ്യഭാഗം ചാർട്ടിൽ എഴുതി പ്രദർശിപ്പിക്കുന്നു. കുട്ടികൾ മൗനമായി രണ്ടു തവണ വായിച്ച്, ചോദ്യങ്ങൾ ഉണ്ടാക്കണം (കുറഞ്ഞത് രണ്ടെണ്ണം.)

75. ഭാരതത്തിൽ ഏറ്റവുമധികം സാക്ഷര ശതമാനമുള്ള നാടാണ് കേരളം. അതുകൊണ്ട് ഇവിടെ ആനുകാലികങ്ങളും ധാരാളമുണ്ട്. രാവിലത്തെ പത്രപാരായണം പ്രഭാത ഭക്ഷണത്തെക്കാൾ പ്രധാനമായിക്കരുതുന്നവരത്രേ നമ്മുടെ നാട്ടിലെ സാധാരണക്കാർപോലും. ഓരോ ദിവസവും ഇറങ്ങുന്ന പത്രങ്ങളുടെ എണ്ണം ആരെയും അമ്പരപ്പിക്കും. വാരികകളെയും മാസികകളെയും സംബന്ധിച്ചും ഇതു തന്നെ പറയാം. ഇവയുടെ സംഖ്യ ഇക്കഴിഞ്ഞ ഏതാനും വർഷംകൊണ്ടു വളരെ വളരെപ്പെരുകിയിരിക്കുന്നു! ഏതു മാടപ്പീടികയിലും ഇന്ന് ഒട്ടേറെ വാരികകൾ തൂങ്ങിക്കിടക്കുന്നതുകാണാം.

– അധ്യാപകൻ ഈ ഗദ്യഭാഗം ഉറക്കെ രണ്ടുതവണ വായിക്കുന്നു. കുട്ടികൾ ഇതുശ്രദ്ധിച്ച് കേന്ദ്രാശയം ഒരു വാക്യത്തിൽ എഴുതണം. അനുയോജ്യമായ ഒരു തലക്കെട്ടും കൊടുക്കണം.

76. പലപ്പോഴും അമ്മയ്ക്കുതോന്നി, ഈ ആളുകൾ മനപ്പൂർവ്വം പരസ്പരം എരികയറ്റുകയാണെന്ന്. വീറും വാശിയും അഭിനയിക്കുകയാണെന്ന്. താൻ സത്യത്തിന് കൂടുതൽ വില കൽപിക്കുന്നുണ്ടെന്ന് ഓരോരുത്തരും മറ്റുള്ളവരെ ബോദ്ധ്യപ്പെടുത്താൻ ശ്രമിക്കുന്നതുപോലെ തോന്നി. മറ്റുള്ളവർ അതുകാണുമ്പോൾ അമർഷം കൊള്ളും. തങ്ങളാണ് സത്യത്തെ കൂടുതൽ വിലമതിക്കുന്നതെന്നു വരുത്തിത്തീർക്കാനുള്ള ശ്രമത്തിൽ അവർ പരുഷവും മൂർച്ചയേറിയതുമായ വാദങ്ങൾ എടുത്തെറിയും. മറ്റുള്ളവരേക്കാൾ പൊക്കത്തിൽ ചാടാനാണ് ഓരോരുത്തരുടെയും നോട്ടമെന്നു തോന്നി. ഇത് അമ്മയുടെ മനസ്സിനെ വ്യാകുലപ്പെടുത്തുകയും വ്യസനിപ്പിക്കുകയും ചെയ്തു.

– അധ്യാപകൻ ഈ ഗദ്യഭാഗം ഉറക്കെ രണ്ടുതവണ വായിക്കുന്നു. കുട്ടികൾ ഇതുശ്രദ്ധിച്ച് കേന്ദ്രാശയം ഒരു വാക്യത്തിൽ എഴുതണം. അനുയോജ്യമായ ഒരു തലക്കെട്ടും കൊടുക്കണം.

77. 'ഇരുളും വെളിച്ചവും' – ഈ പേര് ജീൻവാൽ ജീനിന്റെ കഥയ്ക്ക് അനുയോജ്യമാണോ? എന്തുകൊണ്ട്?

78. "മുത്തശ്ശിക്കു ചവച്ചിരിക്കാനൊരു
തത്വജ്ഞാനമുണ്ടെപ്പോഴും" – 'തത്വജ്ഞാനം ചവയ്ക്കുന്നു.' എന്നു പറയുന്നതിലെ യുക്തിയെന്ത്?

(79 മുതൽ 96 വരെയുള്ള ചോദ്യങ്ങൾക്ക് ഓരോ ഖണ്ഡികയിൽ – കുറഞ്ഞത് 5 വാക്യങ്ങളിൽ – ഉത്തരമെഴുതുക.) (18 x 5 = 90 മാർക്ക്)

79. മാവേലിയെ വരവേല്ക്കാൻ നാം എന്തൊക്കെ ഒരുക്കങ്ങൾ ചെയ്യണമെന്നാണ് പാക്കനാർ പാട്ടിൽ പറയുന്നത്?

80. ഓണാഘോഷത്തിനു പിന്നിലെ ഐതിഹ്യം വിവരിക്കുക.

81. പേപ്പട്ടി വിഷത്തെ മനുഷ്യൻ കീഴ്പ്പെടുത്തിയതെങ്ങനെ?

82. "ഒരു പേനയോളം വലുപ്പമുള്ള വാഴവിത്തോ?"
- ഈ സംശയം നിങ്ങൾ എങ്ങനെ ദൂരീകരിക്കും?

83. "ഇത്തിരി വെള്ളമെന്നാലെന്തതിന്നാഴ –
മെത്രയെന്നാരു പറയും?" – ഈ വരികളിലെ ആശയവും ആസ്വാദ്യതയും വിശദമാക്കുക.

84. "എന്തിനോ പണ്ടുമയഗ്നിയിലെന്നപോൽ
ഞാൻ തപോലീനയാകുന്നു." – സൂചിത കഥയേത്?

85. കുതിരപുറത്തുപോയി, കുതിരപ്പുറത്തുപോയി

– ഈ രണ്ടുവാക്യങ്ങളും താരതമ്യം ചെയ്ത് അർത്ഥവ്യത്യാസവും അതിനുള്ള കാരണവും കണ്ടെത്തുക.

86. ഞാൻ കണ്ട ഉത്സവം/ശാസ്ത്രവും നമ്മുടെ ജീവിതവും/യുദ്ധവും സമാധാനവും/എനിക്കിഷ്ടപ്പെട്ട കലാരൂപം/എനിക്കിഷ്ടപ്പെട്ട സാഹിത്യകാരൻ – ഏതെങ്കിലും ഒരു വിഷയത്തെപ്പറ്റി ഓരോരുത്തരായി സംസാരിക്കുക. (ഒരാൾക്ക് 2 മിനുട്ടുസമയം)

87. നിങ്ങളുടെ വിദ്യാലയത്തിൽ നടക്കുന്ന സാഹിത്യസമാജത്തിനുവേണ്ടി, എല്ലാവിവരങ്ങളും ഉൾക്കൊള്ളിച്ചു കൊണ്ട് ഒരു നോട്ടീസ് തയ്യാറാക്കുക.

88. എന്റെ യാത്ര / നാടൻപാട്ടുകൾ / എനിക്കിഷ്ടമുള്ള കാലാവസ്ഥ / സംഗീതവും ഞാനും / ജാതിചിന്ത - ഏതെങ്കിലും ഒരു വിഷയത്തെക്കുറിച്ച് ഓരോരുത്തരായി സംസാരിക്കുക (ഒരാൾക്ക് 2 മിനുട്ടു സമയം)

89. 'മരുന്നുകൾ ആവശ്യമില്ലാത്ത ലോകം' - ജൈവസാങ്കേതിക വിദ്യയുടെ വികാസത്തിന്റെ ഫല മായി ഇങ്ങനെയൊരവസ്ഥ വന്നാൽ എന്തെല്ലാം പ്രത്യാഘാതങ്ങളുണ്ടാകാം? അപഗ്രഥിക്കുക.

90. കൃഷിക്ക് വളപ്രയോഗം ആവശ്യമില്ലാതെ വരുന്ന അവസ്ഥയെകുറിച്ച് വിലയിരുത്തുക.

91. പാക്കനാർപാട്ടിലെ ഭാഷാപ്രയോഗത്തിന് കാലം, ദേശം, ജാതി എന്നീ ഘടകങ്ങളുമായി ബന്ധ മുണ്ടോ? അപഗ്രഥിക്കുക.

92. "കണ്ണിൽ തോരാത്ത ബാഷ്പവും കണ്ഠത്തിൽ ഒടുങ്ങാത്ത കരച്ചിലും ഹൃദയത്തിൽ തീരാത്ത വേദനയുമായിട്ടല്ലാതെ വിജയശ്രീ ഇന്നേവരെ പ്രത്യക്ഷപ്പെട്ടിട്ടില്ല" - ഈ പ്രസ്താവനയെ അപഗ്ര ഥിക്കുക.

93. 'ബോധവതി' എന്ന കവിതയിലെ, 'തള്ള മരിച്ച പശുക്കിടാവ്', 'ബുദ്ധഭിക്ഷു' എന്നിവയ്ക്ക് പൊതുവായി എന്തെങ്കിലും പ്രതീകാത്മകതയുണ്ടോ? വിലയിരുത്തുക.

94. "ആ വെള്ളിപ്പാത്രങ്ങൾ ന്യായമായും പാവങ്ങൾക്കുള്ളതാണ്."
"എനിക്ക് ആഹാരം കഴിക്കാൻ മരപ്പാത്രം മതിയല്ലോ."
"സ്നേഹിതാ! ഇതാ നിങ്ങളുടെ ദീപങ്ങൾ സ്വീകരിച്ചാലും."
- ഈ സംഭാഷണ ശകലങ്ങളിൽ നിന്ന് ബിഷപ്പിന്റെ സ്വഭാവം വിവരിക്കുക.

95. "രണ്ടുനാലു ദിനം കൊണ്ടൊരുത്തനെ
തണ്ടിലേറ്റി നടത്തുന്നതും ഭവാൻ
മാളിക മുകളേറിയ മന്നന്റെ
തോളിൽ മാറാപ്പു കേറ്റുന്നതും ഭവാൻ" - ഈ വരികൾക്ക് ഒരു ആസ്വാദനക്കുറിപ്പ് തയ്യാറാക്കുക.

96. "വേഗത്തിൽ പോകുന്ന കാളിന്ദിതാനങ്ങു
രാഗത്തെ കേട്ടൊരു നേരത്തപ്പോൾ
ഏറിന വീചിക ജാലമകന്നുട-
നേതുമനങ്ങാതെ നിന്നുപോയി." - ഈ വരികൾക്ക് ഒരു ആസ്വാദനക്കുറിപ്പ് തയ്യാറാക്കുക.

Appendix X

UNIVERSITY OF CALICUT

Department of Education

ACHIEVEMENT TEST IN MALAYALAM LANGUAGE
(Standard VII)
(Final)

Dr. P.K.Sudheesh Kumar P.Sasidharan

നിർദ്ദേശങ്ങൾ

ഇതൊരു മലയാളം പരീക്ഷയാണ്. ചോദ്യക്കടലാസിൽ ഒന്നും എഴുതരുത്. ഉത്തരങ്ങൾ എഴുതുന്നതിന് വേറെ കടലാസു തന്നിട്ടുണ്ട്. ഓരോ ചോദ്യവിഭാഗത്തിനും, തന്നിട്ടുള്ള നിർദ്ദേശമനുസരിച്ച് ഉത്തരമെഴുതുക. ഉത്തരങ്ങൾ മാത്രം എഴുതിയാൽ മതി. സമയം 90 മിനുട്ട്.

(1 മുതൽ 13 വരെയുള്ള ചോദ്യങ്ങൾ വിട്ടഭാഗം പൂരിപ്പിക്കാനുള്ളതാണ്. ഓരോന്നിനും താഴെകൊടുത്തിരിക്കുന്ന ഉത്തരങ്ങളിൽനിന്ന് ഏറ്റവും ശരിയായത് തിരഞ്ഞെടുക്കുക.) (13 X 1=13 മാർക്ക്)

1. 'നങ്ങേമക്കുട്ടി' എന്ന കവിതയുടെ കർത്താവ് ..... ആണ്.

   എ. ഒളപ്പമണ്ണ ബി. വൈലോപ്പിള്ളി
   സി. ജി.ശങ്കരക്കുറുപ്പ് ഡി. ഇടശ്ശേരി

2. പാരമ്പര്യത്തെ നിർണയിക്കുന്ന ഘടകമാണ് .....

   എ. ജീൻ ബി. കോശം
   സി. രക്തം ഡി. ലിംഫ്

3. കാശ്മീരിലൂടെ ഒഴുകുന്ന ഒരു നദിയാണ് .....

   എ. നർമ്മദ ബി. ഝലം
   സി. വൂളാർ ഡി. താപ്തി

4. ശങ്കരവർമ്മൻ ഭരിച്ചിരുന്ന കാലത്ത് കാശ്മീരിന്റെ തലസ്ഥാനമായിരുന്നു .....

   എ. ശ്രീനഗർ ബി. ദാൽ
   സി. ഗുൽമാർഗ് ഡി. പട്ടൻ

5. ഒരാൾ മറ്റൊരാളുടെ ജീവിതത്തെക്കുറിച്ച് എഴുതുന്നതാണ് .....

   എ. ആത്മകഥ ബി. അനുസ്മരണക്കുറിപ്പ്
   സി. ജീവചരിത്രം ഡി. ജീവിതാനുഭവങ്ങൾ

6. വിക്ടർ ഹ്യൂഗോയുടെ ലാമിറാബിലെ ..... ഭാഷയിൽ എഴുതിയ കൃതിയാണ്.

   എ. ഇംഗ്ലീഷ് ബി. സ്പാനിഷ്
   സി. ഫ്രഞ്ച് ഡി. റഷ്യൻ

7. മുന്തിരിച്ചാറ് വീഞ്ഞായി മാറുന്ന പ്രവർത്തനത്തെ ..... എന്നുപറയുന്നു.

   എ. കിണ്വനം ബി. കഥനം
   സി. ത്വരണം ഡി. ഖാദനം

8. ചിനാർ മരങ്ങളുടെ തറവാട് ..... ആണ്.

   എ. റഷ്യ ബി. മലേഷ്യ
   സി. പേർഷ്യ ഡി. പ്രഷ്യ

9. കണ്ണന്റെ ഗാനം കേട്ടപ്പോൾ പുഴയിലെ മീനുകൾ .....

   എ. അനങ്ങാതെ കേട്ടുനിന്നു. ബി. വെള്ളത്തിൽ തുള്ളിക്കളിച്ചു.
   സി. കരയിൽ കയറി കണ്ണന്റെ മുന്നിലെത്തി. ഡി. നീന്തിരസിച്ചു.

10. "മാവേലിയാം വരവതുണ്ടേ." - എന്തിനാണ് മാവേലി വരുന്നത് ?

    എ. ദുഷ്ടരെ വകവരുത്താൻ ബി. ഇപ്പോഴത്തെ ഭരണാധികാരിയെ നേരിട്ടുകാണാൻ
    സി. മനുഷ്യജീവിതം നേരിട്ടുകാണാൻ ഡി. ഓണം ആഘോഷിക്കാൻ

11. കൈനിക്കരയുടെ അഭിപ്രായത്തിൽ യുദ്ധവിജയത്തിനുവേണ്ടി ആഹൂതി ചെയ്യപ്പെടുന്നവയിൽ ഏറ്റവും മഹത്തായ ഒന്നാണ് .....

എ. സമാധാനം ബി. സംസ്കാരം
സി. മനുഷ്യത്വം ഡി. സ്നേഹം

12. "തീക്കും തന്നുള്ളിലേ തോന്നിത്തുടങ്ങിതേ
തീക്കായ വേണമെനിക്കുമെന്ന് " - ഇങ്ങനെ ഒരവസ്ഥ വന്നാൽ .....

എ. എല്ലാവർക്കും സുഖമായി ജീവിക്കാം. ബി. ആർക്കും തീയിനെ പേടിയുണ്ടാവില്ല.
സി. ആർക്കും ജീവിക്കാൻ സാധ്യമല്ല. ഡി. രോഗമുള്ളവർക്ക് ജീവിക്കാൻ സാധ്യമല്ല.

13. ഉറച്ച കാൽവയ്പ്പോടെയാണ് താൻസെൻ അക്ബർ ചക്രവർത്തിയുടെ വേദിയിൽ പ്രവേശിച്ചത്; കാരണം .....

എ. അദ്ദേഹം ആരോഗ്യവാനായിരുന്നു.
ബി. സംഗീതത്തിന്റെ കാര്യത്തിൽ അദ്ദേഹത്തിന് ആത്മവിശ്വാസമുണ്ടായിരുന്നു.
സി. അദ്ദേഹം ചെറുപ്പമായിരുന്നു.
ഡി. വേദിയിൽ തന്റെ മകളുണ്ടെന്ന് അദ്ദേഹത്തിനറിയാമായിരുന്നു.

(14 മുതൽ 30 വരെയുള്ള ചോദ്യങ്ങൾക്ക്, ശരിയുത്തരം, ഓരോന്നിനും താഴെ കൊടുത്തിട്ടുള്ളവയിൽനിന്ന് തിരഞ്ഞെടുക്കുക.) (17X1=17 മാർക്ക്)

14. 'അജപാലകർ' - ഈ പദത്തിന്റെ അർത്ഥമെന്ത്?

എ. പശുവിനെ പാലിക്കുന്നവർ ബി. ആട്ടിടയന്മാർ
സി. ആനപ്പാപ്പാന്മാർ ഡി. ആട്ടിൻപാൽ കുടിക്കുന്നവർ

15. 'വാചാമഗോചരം' - ഈ പദത്തിന്റെ അർത്ഥമെന്ത്?

എ. വാക്കുകൊണ്ടുവിവരിക്കാനാവാത്തത്. ബി. വായനകൊണ്ടു മനസ്സിലാക്കാനാവാത്തത്
സി. കണ്ണുകൊണ്ടുകാണാൻ കഴിയാത്തത്. ഡി. കാതുകൊണ്ടു കേൾക്കാനാവാത്തത്.

16. കുട്ടിക്കാലത്ത് തകഴിക്ക് കഥകളി കാണുന്നതിലുമധികം രസം തുള്ളൽ കാണുന്നതിലായിരുന്നു. എന്തുകൊണ്ട്?

എ. കഥകളി ഇഷ്ടമായിരുന്നില്ല.
ബി. കഥകളി മുഴുവൻ മനസ്സിലാക്കാൻ കഴിഞ്ഞിരുന്നില്ല.
സി. തുള്ളൽ കുറച്ചുസമയമേ ഉണ്ടായിരുന്നുള്ളൂ.
ഡി. ഉറക്കമൊഴിക്കാൻ ഇഷ്ടമായിരുന്നില്ല.

17. കൈനിക്കരയുടെ അഭിപ്രായത്തിൽ യഥാർത്ഥ വിജയമെന്നാലെന്താണ്?

എ. യുദ്ധം ചെയ്യാതിരിക്കുന്നത് ബി. യുദ്ധത്തിൽ ജയിക്കുന്നത്
സി. യുദ്ധത്തെ ജയിക്കുന്നത് ഡി. യുദ്ധം ചെയ്യാതെ ജയിക്കുന്നത്

18. ആ വിചാരം ജീനിന് ഒരു ബാധോപദ്രവം പോലെയായിത്തീർന്നു. ഏതു വിചാരം?

എ. സഹോദരിയെക്കുറിച്ചുള്ള വിചാരം
ബി. ബിഷപ്പിന്റെ വെള്ളിപ്പാത്രങ്ങളെക്കുറിച്ചുള്ള വിചാരം
സി. ജയിൽ ജീവിതത്തെക്കുറിച്ചുള്ള വിചാരം
ഡി. ഭാവിയെക്കുറിച്ചുള്ള വിചാരം

19. 'ഭിക്ഷ ചോദിക്കുന്നവൾ' - ഈ അർത്ഥം വരുന്ന പദമേത്?

എ. ഭിക്ഷു ബി. ഭിക്ഷുകി സി. ഭിക്ഷിണി ഡി. ഭിക്ഷിനി

20. താഴെ കൊടുത്തിട്ടുള്ളവയിൽ ഒറ്റപ്പെട്ട പദമേത്?

എ. ആരാമം ബി. ഉദ്യാനം സി. വേദിക ഡി. വാടിക

21. 'പൊൽത്താമര' - ഈ പദം പിരിച്ചെഴുതുന്നതെങ്ങനെ?

എ. പൊൽ+താമര ബി. പൊൽ+ത്താമര
സി. പൊൻ+ത്താമര ഡി. പൊൻ+താമര

22. ചോദ്യ+ഉത്തരം - ഇതിന്റെ സംയുക്ത രൂപം തിരഞ്ഞെടുക്കുക.

എ. ചോദ്യുത്തരം ബി. ചോദ്യോത്തരം
സി. ചോദ്യൂത്തരം ഡി. ചോദ്യവും ഉത്തരവും

23. യൂറോപ്പിൽ തണുപ്പുകാലത്ത് കൂലിപ്പണിക്കാർക്ക് പണി കുറവായിരിക്കും. ഏതവസരത്തിലാണ് നമ്മുടെ നാട്ടിലെ കൂലിപ്പണിക്കാർക്ക് ഇത്തരമൊരവസ്ഥ ഉണ്ടാവുന്നത് ?

എ. മഞ്ഞുകാലത്ത് ബി. കർക്കിടകത്തിലെ മഴക്കാലത്ത്

സി. തുലാവർഷക്കാലത്ത് ഡി. കൊടിയ വേനൽക്കാലത്ത്

24. 'കള്ളൻ', 'ഇരുളും വെളിച്ചവും' എന്നീ കഥകളിലെ മുഖ്യ കഥാപാത്രങ്ങൾ താഴെ പറയുന്നവയിൽ ഏതുകാര്യത്തിൽ സമാനരാണ്?

എ. രണ്ടുപേരും ഒരേ പ്രായമുള്ളവരായിരുന്നു.

ബി. മോഷണം ഇരുവർക്കും ജന്മവാസനയായിരുന്നു.

സി. ദാരിദ്ര്യം രണ്ടുപേരെയും കള്ളന്മാരാക്കി.

ഡി. രണ്ടുപേരും സഹോദരിയുടെ കുഞ്ഞുങ്ങൾക്കുവേണ്ടിയാണ് മോഷ്ടിച്ചത്.

25. സമൂഹത്തെ സംബന്ധിക്കുന്നത് എന്ന അർത്ഥത്തിൽ താഴെ പറയുന്നവയിൽ ശരിയേത്?

എ. സാമൂഹ്യം ബി. സാമൂഹികം

സി. സാമൂഹ്യകം ഡി. സാമൂഹീകം

26. 'ശൃംഖല' – ഈ സംസ്കൃത പദത്തിനു സമാനാർത്ഥമുള്ള മലയാള പദമേത്?

എ. പൊങ്കാല ബി. ചങ്ങല

സി. ചേങ്കില ഡി. ചേമ്പില

27. ബിഷപ്പിന്റെ മുറിയുടെ വാതിൽ എപ്പോഴും തുറന്നിട്ടിരിക്കുന്നതിനു കാരണമെന്തായിരിക്കും?

എ. ആ മുറിക്കുപൂട്ടില്ല.

ബി. മിക്കദിവസവും മുറി പൂട്ടാൻ ബിഷപ്പു മറക്കും.

സി. ഉറങ്ങാൻ ബിഷപ്പിനു ശുദ്ധവായു കിട്ടണം.

ഡി. ആർക്കും എപ്പോഴും അവിടേക്കു കയറിച്ചെല്ലാൻ സൗകര്യത്തിന്.

28. "മുഖത്ത് കരിയും ചെങ്കല്ലും തേച്ച് വേഷം കെട്ടിനിന്ന എന്നെ രണ്ടടിയടിച്ച് അമ്മ വിളിച്ചുകൊണ്ടുപോയി." – അമ്മ ശിവശങ്കരനെ തല്ലാൻ കാരണമെന്തായിരിക്കും?

എ. മകനോടുള്ള വിരോധം

ബി. കഥകളിയോടുള്ള വിരോധം

സി. രാത്രിയായിട്ടും വീട്ടിലെത്താത്തതിലുള്ള ദേഷ്യം

ഡി. രാത്രി ഉറക്കമൊഴിച്ചതിലുള്ള ദേഷ്യം

29. സച്ചിദാനന്ദന്റെ 'ബോധവതി' എന്ന കവിതയിലൂടെയും കുമാരനാശാന്റെ 'ചണ്ഡാലഭിക്ഷുകി' എന്ന കവിതയിലൂടെയും കടന്നുപോകുമ്പോൾ നാം എത്തിച്ചേരുന്ന പൊതുനിഗമനം എന്ത്?

എ. കുടിവെള്ളം കൊടുക്കുന്നതിന് ജാതിപ്രശ്നമാക്കേണ്ടതില്ല.

ബി. ജാതി ചിന്ത ഒഴിവാക്കേണ്ടതാണ്.

സി. ജാതി ചിന്ത അർത്ഥമില്ലാത്തതാണ്.

ഡി. ജാതി ചിന്ത അപകടകരമാണ്.

30. തന്റെ വെള്ളിപ്പാത്രങ്ങൾ മോഷ്ടിച്ച ജീനിന് വെള്ളിവിളക്കുകൾ കൂടി നൽകിയ ബിഷപ്പിന്റെ നടപടിയെക്കുറിച്ചുള്ള ചില പ്രതികരണങ്ങൾ താഴെ കൊടുക്കുന്നു. നിങ്ങൾക്കു സ്വീകാര്യമായത് തിരഞ്ഞെടുക്കുക.

എ. നന്നായി, ഇനി മറ്റൊരു കള്ളനും അതു മോഷ്ടിക്കുകയില്ലല്ലോ.

ബി. ശരിയായില്ല, അതു കള്ളന്മാരെ പ്രോത്സാഹിപ്പിക്കും.

സി. നന്നായി, കാരണം അത് ജീനിന്റെ മാനസാന്തരത്തിന് വഴിതെളിക്കും.

ഡി. ഉചിതമായി, കാരണം ബിഷപ്പുമാർ ആഡംബര വസ്തുക്കൾ ഉപേക്ഷിക്കേണ്ടതാണ്.

(31 മുതൽ 39 വരെയുള്ള ചോദ്യങ്ങൾക്ക് ഒന്നോ രണ്ടോ വാക്യത്തിൽ ഉത്തരമെഴുതുക.)

(9 X 2 = 18 മാർക്ക്)

31. അന്നവിചാരം, വനനശീകരണം – ഈ പദങ്ങളുടെ വികസിത രൂപമെഴുതുക.

32. ചിനാർമരങ്ങൾ കാശ്മീരികൾക്ക് ശരീരസുഖം നൽകുന്നതെങ്ങനെ?

33. ഉമ്മൻസാറിന്റെ 'രചന' പീരിയഡ് എല്ലാ കുട്ടികൾക്കും ഇഷ്ടമായിരുന്നു. എന്തുകൊണ്ട്?

34. ഹനൂമാന്റെ പാട്ടു കേട്ടിരുന്ന നാരദന് ഒടുവിൽ ഇരുന്നിടത്തുനിന്ന് എണീക്കാൻ പറ്റാതായി. കാരണമെന്തായിരുന്നു?

35. കാലാവസ്ഥയുമായി ബന്ധമുള്ള ഒരു പഴഞ്ചൊല്ല് എഴുതുക. അതിന്റെ ആശയം ഒരു വാക്യത്തിൽ വിശദമാക്കുക.

36. പണ്ട് ഒരു പ്രത്യേക പ്രദേശത്തുമാത്രം ഉപയോഗിച്ചിരുന്ന ഭാഷയല്ല സംസ്കൃതം. ഇന്ത്യ ഒട്ടാകെ അതിനു പ്രചാരമുണ്ടായിരുന്നു. ഭാരതസംസ്കാരത്തിന്റെ ഉറവിടമായ വേദങ്ങൾ, ഉപനിഷത്തുകൾ, ഇതിഹാസങ്ങൾ, ശാസ്ത്രങ്ങൾ എന്നിവയെല്ലാം സംസ്കൃതത്തിലാണ് ആദ്യമുണ്ടായത്. ദക്ഷിണ ഭാരതത്തിലെ ഭാഷകളിൽ ധാരാളം സംസ്കൃത ശബ്ദങ്ങൾ ചേർന്നു കിടപ്പുണ്ട്. മലയാളം, തെലുങ്ക്, കന്നഡ എന്നീ ഭാഷകളിലാണ് സംസ്കൃതത്തിന്റെ പ്രഭാവം ഏറെ കാണുന്നത്. തമിഴിൽ അതുവളരെക്കുറവാണ്. ഭാരതീയ ഭാഷകളെ കൂട്ടിയിണക്കുന്ന ബലിഷ്ഠമായ ഒരു കണ്ണിയാണ് സംസ്കൃതം.

ഈ ഖണ്ഡിക ചാർട്ടിൽ എഴുതി പ്രദർശിപ്പിക്കുന്നു. കുട്ടികൾ മൗനമായി രണ്ടുതവണവായിച്ച് ചോദ്യങ്ങൾ ഉണ്ടാക്കണം. (കുറഞ്ഞത് രണ്ടെണ്ണം)

37. കുഞ്ഞുങ്ങൾ വിശന്നുതളരുന്നത് സഹിക്കാനാവാതെ, ജീൻ ഒരു കടയിൽനിന്ന് റൊട്ടി മോഷ്ടിച്ചു. ജീനിന്റെ സ്ഥാനത്ത് നിങ്ങളായിരുന്നുവെങ്കിൽ എന്തുചെയ്യുമായിരുന്നു?

38. പലപ്പോഴും അമ്മയ്ക്കുതോന്നി, ഈ ആളുകൾ മനപ്പൂർവ്വം പരസ്പരം എരികയറ്റുകയാണെന്ന്. വീറും വാശിയും അഭിനയിക്കുകയാണെന്ന്. താൻ സത്യത്തിന് കൂടുതൽ വില കൽപിക്കുന്നുണ്ടെന്ന് ഓരോരുത്തരും മറ്റുള്ളവരെ ബോദ്ധ്യപ്പെടുത്താൻ ശ്രമിക്കുന്നതുപോലെ തോന്നി. മറ്റുള്ളവർ അതുകാണുമ്പോൾ അമർഷം കൊള്ളും. തങ്ങളാണ് സത്യത്തെ കൂടുതൽ വിലമതിക്കുന്നതെന്നു വരുത്തിത്തീർക്കാനുള്ള ശ്രമത്തിൽ അവർ പരുഷവും മൂർച്ചയേറിയതുമായ വാദങ്ങൾ എടുത്തെറിയും. മറ്റുള്ളവരേക്കാൾ പൊക്കത്തിൽ ചാടാനാണ് ഓരോരുത്തരുടെയും നോട്ടമെന്നു തോന്നി. ഇത് അമ്മയുടെ മനസ്സിനെ വ്യാകുലപ്പെടുത്തുകയും വ്യസനിപ്പിക്കുകയും ചെയ്തു.

– അധ്യാപകൻ ഈ ഗദ്യഭാഗം ഉറക്കെ രണ്ടുതവണ വായിക്കുന്നു. കുട്ടികൾ ഇതുശ്രദ്ധിച്ച് കേന്ദ്രാശയം ഒരു വാക്യത്തിൽ എഴുതണം. അനുയോജ്യമായ ഒരു തലക്കെട്ടും കൊടുക്കണം.

39. "മുത്തശ്ശിക്കു ചവച്ചിരിക്കാനൊരു
തത്വജ്ഞാനമുണ്ടെപ്പോഴും" – 'തത്വജ്ഞാനം ചവയ്ക്കുന്നു.' എന്നു പറയുന്നതിലെ യുക്തിയെന്ത്?

(40 മുതൽ 48 വരെയുള്ള ചോദ്യങ്ങൾക്ക് ഓരോ ഖണ്ഡികയിൽ – കുറഞ്ഞത് 5 വാക്യങ്ങളിൽ – ഉത്തരമെഴുതുക.) (9 x 5 = 45 മാർക്ക്)

40. ഓണാഘോഷത്തിനു പിന്നിലെ ഐതിഹ്യം വിവരിക്കുക.

41. പേപ്പട്ടി വിഷത്തെ മനുഷ്യൻ കീഴ്പ്പെടുത്തിയതെങ്ങനെ?

42. "ഒരു പേനയോളം വലുപ്പമുള്ള വാഴവിത്തോ?"

– ഈ സംശയം നിങ്ങൾ എങ്ങനെ ദൂരീകരിക്കും?

43. ഞാൻ കണ്ട ഉത്സവം/ശാസ്ത്രവും നമ്മുടെ ജീവിതവും/യുദ്ധവും സമാധാനവും/എനിക്കിഷ്ടപ്പെട്ട കലാരൂപം/എനിക്കിഷ്ടപ്പെട്ട സാഹിത്യകാരൻ – ഏതെങ്കിലും ഒരു വിഷയത്തെപ്പറ്റി ഓരോരുത്തരായി സംസാരിക്കുക. (ഒരാൾക്ക് 2 മിനുട്ടുസമയം)

44. നിങ്ങളുടെ വിദ്യാലയത്തിൽ നടക്കുന്ന സാഹിത്യസമാജത്തിനുവേണ്ടി, എല്ലാവിവരങ്ങളും ഉൾക്കൊള്ളിച്ചു കൊണ്ട് ഒരു നോട്ടീസ് തയ്യാറാക്കുക.

45. 'മരുന്നുകൾ ആവശ്യമില്ലാത്ത ലോകം' – ജൈവസാങ്കേതിക വിദ്യയുടെ വികാസത്തിന്റെ ഫലമായി ഇങ്ങനെയൊരവസ്ഥ വന്നാൽ എന്തെല്ലാം പ്രത്യാഘാതങ്ങളുണ്ടാകാം? അപഗ്രഥിക്കുക.

46. കൃഷിക്ക് വളപ്രയോഗം ആവശ്യമില്ലാതെ വരുന്ന അവസ്ഥയെകുറിച്ച് വിലയിരുത്തുക.

47. "ആ വെള്ളിപ്പാത്രങ്ങൾ ന്യായമായും പാവങ്ങൾക്കുള്ളതാണ്."
"എനിക്ക് ആഹാരം കഴിക്കാൻ മരപ്പാത്രം മതിയല്ലോ."
"സ്നേഹിതാ! ഇതാ നിങ്ങളുടെ ദീപങ്ങൾ സ്വീകരിച്ചാലും."

– ഈ സംഭാഷണ ശകലങ്ങളിൽ നിന്ന് ബിഷപ്പിന്റെ സ്വഭാവം വിവരിക്കുക.

48. "രണ്ടുനാലു ദിനം കൊണ്ടൊരുത്തനെ
തണ്ടിലേറ്റി നടത്തുന്നതും ഭവാൻ
മാളിക മുകളേറിയ മന്നന്റെ
തോളിൽ മാറാപ്പു കേറ്റുന്നതും ഭവാൻ" – ഈ വരികൾക്ക് ഒരു ആസ്വാദനക്കുറിപ്പ് തയ്യാറാക്കുക.

Appendix XI

DEPARTMENT OF EDUCATION
UNIVERSITY OF CALICUT
GENERAL DATA SHEET

നിർദ്ദേശങ്ങൾ :

താഴെ പറയുന്ന ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിച്ച് ഉത്തരം എഴുതേണ്ടിടത്ത് എഴുതുക. ഉത്തരങ്ങൾ കൊടുത്തിട്ടുള്ളിടത്ത് ശരിയായ ഉത്തരത്തിനെതിരെ ശരി അടയാളം ഇടുക.

1. പേര്.....
2. ആൺകുട്ടി/പെൺകുട്ടി
3. സ്ഥലം/സ്ഥാപനം.....
4. തിയ്യതി.....
5. കുടുംബാംഗങ്ങളെക്കുറിച്ചുള്ള വിവരം താഴെ [1] മുതൽ [9] വരെയുള്ള കോളങ്ങളിൽ രേഖപ്പെടുത്തുന്നതാണ്. അതിൽ ആവശ്യമുള്ള കോളത്തിൽ ശരി [✓] അടയാളപ്പെടുത്തുക.

അംഗങ്ങൾ	അക്ഷരജ്ഞാനം ഇല്ല	Std. I to IV	Std. IV to VII	Std. VIII to X	Pre University, Pre Degree, T T C Intermediate	BA, BSc, Bcom Eng. Diploma etc.	MA, MSc, MEd, BL. BSc [Engg], MSc [Engg], MBBS, BSc [Tech], Ph. D. etc.	തൊഴിലുണ്ടെങ്കിൽ തൊഴിലിന്റെ പേര്	മറ്റുവിവരങ്ങൾ
	1	2	3	4	5	6	7	8	9
പിതാവ് (രക്ഷാകർത്താവ്)									
മാതാവ്									

Appendix XII

DEPARTMENT OF EDUCATION
UNIVERSITY OF CALICUT

GENERAL DATA SHEET

Instructions:

Read the questions given below carefully and write down the answers wherever necessary. Put a tick mark (✓) against the correct answer, where the answers are given.

1. Name .....
2. Boy/Girl .....
3. School/Institution .....
4. Date .....
5. The informations about the family members can be indicated in the column given below from 1 to 9. Put a tick mark (✓) in the necessary columns.

Members	Illiterate	Std. I to IV	Std. IV to VII	Std. VIII to X	Pre University, Pre-Degree, TTC, Inter-mediate	B.A., B.Sc., B.Com. Eng. Diploma etc.	M.A.. M.Sc., M.Ed., BL., B.Sc. (Engg), M.B.B.S., B.Sc., (Tech), Ph.D. etc.	If any occupation, the name of the occupation	Monthly Income
	1	2	3	4	5	6	7	8	9
Father (Guardian)									
Mother									

Appendix XIII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

CLASSROOM INTERACTION RATING SCALE

Dr. P.K.Sudheesh Kumar P.Sasidharan

	Sl.No	Interaction Patterns	Always	Occasionally	Never
Inter-group interaction	1	Participates in individual discussion			
	2	Participates in group discussion			
	3	Considers the opinions and ideas of others			
	4	Participates in making group decisions			
	5	Accept and abide group decisions			
	6	Assumes responsibilities in carrying out group plans			
	7	Assumes leadership at appropriate times			
	8	No interaction			
Intra-group interaction	1	Exchange of ideas and materials			
	2	Considers the opinions and ideas of other groups			
	3	Accept and abide the decisions of other groups			
	4	No interaction			
Student-Teacher interaction	1	Exchange ideas and materials			
	2	Communication			
	3	Individual interaction			
	4	Group interaction			
	5	Interaction to the whole class			
	6	No interaction			
	7	Individual reward			
	8	Group reward			
	9	Whole class reward			
	10	No reward			

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